

# MINERALOGICAL ABSTRACTS

(Vol. 3, No. 3, September 1926.)

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## New Minerals.

MOROZEWICZ (J.). *O kilku amfibolach żelazisto-alkalicznych.*—*Sur quelques amphiboles ferro-alkalines.* Spraw. Polsk. Inst. Geol. (Bull. Serv. Géol. Pologne), 1923, vol. 2, pp. 5–15 (Polish), 1 fig.

— *Über einige Eisenalkali-amphibole.* Tschermaks Min. Petr. Mitt., 1925, vol. 38, pp. 210–222, 1 fig.

— *Sur quelques amphiboles ferro-alkalines.* Compt. Rend. Congrès Géol. Intern., Session XIII (Belgique, 1922), 1926, vol. 3, pp. 1623–1633, 1 fig.

The alkali-rocks of the Mariupol district, on the Sea of Azov in Ukraine, contain amphiboles of peculiar types. *Taramite* (anal. I–II) occurs as short-prismatic, bluish-black crystals in dikes of mariupolite intersecting the alkali-granite of the Wali-tarama valley. *Fluotaramite* (III–V) as long-acicular, greenish-black crystals in dikes of syenite-pegmatite. In both, the optic axial plane is perpendicular to the plane of symmetry and  $\gamma = b$ ; in taramite  $\beta : c = + 14^\circ$  (red) to  $+ 18^\circ$  (violet), whilst in fluotaramite  $\alpha : c = - 12^\circ$  to  $16^\circ$ . For fluotaramite  $\alpha 1.657$ , all other indices being higher than this. The pleochroism is intense: for taramite,  $\gamma$  dark-green to black,  $\beta$  bluish-green,  $\alpha$  pale-yellow; for fluotaramite,  $\gamma$  dark-green,  $\alpha$  bluish-green,  $\beta$  yellowish. Taramite is remarkable in being readily and completely decomposed by hot hydrochloric acid. It is further remarkable in being low in silica and high in iron; the water is also high, although the material is perfectly fresh. The densities of the materials analysed are 3.4761, 3.4389, 3.2308, 3.3176, and 3.2671 respectively; and the melting-points range from  $1000^\circ$  to  $1085^\circ$  C. Metasilicate formulae, on the same lines as the general formula of S. L. Penfield and F. C. Stanley (1907), are deduced, with divalent basic radicles  $[R'''_2O(OH, F)_2]$ ,  $[R'''_2O_4R''Na_2]$ , &c. In fluotaramite the glaucophane-riebeckite molecule  $Na_2R'''_2(SiO_3)_4$  is present in large amount. Taramite shows some analogies to hastingsite, and fluotaramite to crossite.

	I.	II.	III.	IV.	V.
SiO <sub>2</sub> ... ..	37.51	38.81	52.59	50.62	50.00
TiO <sub>2</sub> ... ..	0.73	1.07	0.91	1.03	0.46
Al <sub>2</sub> O <sub>3</sub> ... ..	8.50	9.23	1.64	1.67	3.46
Fe <sub>2</sub> O <sub>3</sub> ... ..	11.41	11.94	7.69	12.40	10.36
FeO ... ..	23.21	21.72	11.80	8.63	12.46
MnO ... ..	1.70	0.64	0.60	5.35	0.36
MgO ... ..	0.56	0.47	9.32	5.70	8.27
CaO ... ..	7.91	6.87	3.41	0.50	3.55
Na <sub>2</sub> O ... ..	3.79	4.76	6.79	8.05	6.15
K <sub>2</sub> O ... ..	2.10	2.24	2.06	2.94	2.14
F ... ..	0.14	0.13	2.05	2.40	1.75
H <sub>2</sub> O (+105°) ...	2.32	2.19	1.44	1.32	1.64
H <sub>2</sub> O (105°) ...	0.33	0.18	0.34	0.23	0.21
Total (less O for F)	100.15	100.25	99.78	99.83	100.07

L. J. S.

FLINK (Gust.). *Quenselit, ein neues Mineral von Långban.* Geol. För. Förh. Stockholm, 1926, vol. 47 (for 1925), pp. 377-384, 2 figs.

Quenselite, another new mineral from Långban, Sweden, occurs as small (1 mm.) pitch-black crystals with calcite and baryte in crevices of the granular haematite ore. The crystals are monoclinic holohedral and tabular parallel to  $b$  (010), with  $a:b:c = 0.9767:1:1.6667$ ,  $\beta = 86^\circ 54'$ , and forms  $a(100)$ ,  $b(010)$ ,  $c(001)$ ,  $m(110)$ ,  $e(011)$ ,  $d(50\bar{1})$ ,  $p(111)$ . There is a perfect cleavage parallel to  $c(001)$ . The crystals have a metallic or adamantine lustre, dark greyish-brown streak, and are quite opaque. Sp. gr. 6.842, H.  $2\frac{1}{2}$ . The mineral is soluble in dilute acids, even acetic, with evolution of chlorine. Analysis by G. K. Almström, PbO 69.51, Fe<sub>2</sub>O<sub>3</sub> 0.39, MnO 23.21, CaO 0.97, MgO 0.30, Na<sub>2</sub>O 0.28, K<sub>2</sub>O 0.17, CO<sub>2</sub> 0.64 (as calcite), H<sub>2</sub>O 3.02, O 2.38, total 100.87, gives the formula  $2\text{PbO} \cdot \text{Mn}_2\text{O}_3 \cdot \text{H}_2\text{O}$ , representing a basic lead manganite.

L. J. S.

GEIJER (Per). *Norbergite and fluoborite, two new minerals from the Norberg mining district.* (Preliminary report.) Geol. För. Förh. Stockholm, 1926, vol. 48, pp. 84-85.

*Norbergite* was found as pink-white masses with tremolite and orthite in the Östanmossa iron mine, Norberg, central Sweden. It has H.  $6\frac{1}{2}$ , D 3.13-3.15,  $\alpha$  1.563,  $\beta$  1.567,  $\gamma$  1.590,  $2E$   $82^\circ$ , positive. It is soluble in warm HCl, and has the formula  $\text{Mg}_2\text{SiO}_4 \cdot \text{Mg}(\text{F},\text{OH})_2$ , containing F 13.70%. *Fluoborite* occurs as colourless hexagonal prisms with magnetite, ludwigite, chondrodite, szabibelyite (?), &c., in the Tallgruvan mine. It has H. about  $3\frac{1}{2}$ , D 2.89,  $\omega$  1.566,  $\epsilon$  1.528. A preliminary



analysis shows it to be a magnesium borate with much fluorine and water.

L. J. S.

[KOSTYLEVA (E. E.) Костылева (Е. Е.). Рамзаит из Хибинских и Ловозерских тундр. [*Ramsayite from Khibinsky and Lovozersky tundras.*] Изв. Росс. Акад. Наук (Bull. Acad. Sci. Russie), 1925, ser. 6, vol. 19, pp. 363-382, 4 figs.

A more detailed account is now given of this new mineral [Abstr., vol. 2, p. 250]. Particulars are given of its occurrence at nineteen places in the Kola peninsula. The crystals are up to 6 cm. in length. Additional forms are noted, and these have simpler indices when the  $a$ -axis is taken as half the value previously given. The ratios now given are  $a:b:c = 0.60522:1:1.64983$ , and the forms (100), (410), (210), (320), (110), (011), (111), (211), (311), (411), (121), (221), (421), (131). The commonest forms are (100), (210), (111), (211). The light-figures are indicated on a gnomonic projection. A new analysis by S. M. Kurbatov gave  $\text{SiO}_2$  34.07,  $\text{TiO}_2$  47.00,  $\text{FeO}$  1.71,  $\text{CaO}$  0.09,  $\text{Na}_2\text{O}$  16.88,  $\text{K}_2\text{O}$  0.12 = 99.87. Structural formulae are given. The characters of ramsayite and of lorenzenite are tabulated and compared. P. N. C.

[KOSTYLEVA (E. E.) Костылева (Е. Е.). Пектолит Хибинских тундр. [*Pectolite from Khibinsky tundra.*] Изв. Росс. Акад. Наук (Bull. Acad. Sci. Russie), 1925, ser. 6, vol. 19, pp. 383-404, 1 fig.

Several occurrences of pectolite and its paragenesis in the nepheline-syenites of the Kola peninsula are described. The following analyses are given: I (also  $\text{MgO}$  1.09), crystalline, from Kukisvumchorr; II, fibrous, from Kukisvumchorr; III, from Yuksporlak pass; IV, from Turii cape; I-III by N. P. Vrevskaya, IV by D. Belyankin and A. Shimpf [cf. Abstr., vol. 2, p. 264]. Pectolite from Yuksporlak has  $\alpha$  1.6098,  $\beta$  1.16430 [i.e. 1.6430?],  $\gamma$  1.6419,  $\gamma - \alpha$  0.0332,  $2V$   $53.34^\circ$  (calc.), optically positive [but the indices, if correct, indicate negative]; that from Kukisvumchorr has  $\gamma - \alpha$  0.0317; and for pectolite from Turii cape D. Belyankin gives mean  $n$  1.61,  $\gamma - \alpha$  0.038,  $2V$   $60^\circ$ .

	$\text{SiO}_2$ .	$\text{TiO}_2$ .	$\text{Al}_2\text{O}_3$ .	$\text{Fe}_2\text{O}_3$ .	$\text{MnO}$ .	$\text{CaO}$ .	$\text{Na}_2\text{O}$ .	$\text{K}_2\text{O}$ .	$\text{H}_2\text{O}$ .	Total.
I.	51.64	—	0.68	1.00	0.86	32.46	7.67	0.59	3.21	99.20
II.	49.00	—	1.91	1.39	2.17	32.26	8.99	0.60	4.08	100.40
III.	53.80	—	2.06	0.95	0.55	32.04	7.38	0.53	2.85	'99.31'
IV.	51.16	0.33	0.92	0.93	0.60	32.30	8.00	0.84	4.96	'100.29'

The new mineral *yuksporite* [Abstr., vol. 2, p. 264] is often associated with pectolite. It forms rose or red veins of short fibres and scales. Hardness slightly over 5,  $\gamma - \alpha$  0.0166,  $2V$   $46^\circ$  to  $75\frac{1}{2}^\circ$ , optically positive



and with positive elongation. Pleochroism is marked,  $\alpha$  pale yellow-rose,  $\beta$  and  $\gamma$  rose-yellow. Analyses V–VII of material from two localities in the Yukspor massif. The mineral is related to Na-xonotlite.

	SiO <sub>2</sub> .	TiO <sub>2</sub> .	Ti <sub>2</sub> O <sub>3</sub> .	Al <sub>2</sub> O <sub>3</sub> .	MnO.	MgO.	CaO.	Na <sub>2</sub> O.	K <sub>2</sub> O.	H <sub>2</sub> O.	Total.
V.	37.22	14.78	5.80	—	0.58	0.27	23.44	5.06	8.02	5.42	100.59
VI.	55.44	5.28	0.44	—	0.45	0.43	18.81	10.76	2.52	5.61	99.74
VII.	40.68	4.10	0.69	11.81	0.28	0.28	21.38	12.91	4.25	3.26	99.64

P. N. C.

PAULY (Antonio). *Bolivianit und Silesit, zwei neue Mineralien der bolivianischen Zinnlagerstätten.* Centralblatt Min., Abt. A, 1926, pp. 43–46.

Four types of Bolivian tin veins are distinguished. Secondary enrichment and cementation are of importance in these veins. 'Bolivianite' [not the Bolivian of A. Breithaupt, 1866] is abundant as fine druses of black crystals in veins of the 'Uncia type'. It contains Sn 35, Cu 25, S 33 %, and sometimes Fe up to 10 %. The crystals are trigonal with rhombohedral faces, good rhombohedral cleavage, and axial ratio (about 1 : 0.8) near that of wurtzite. H. 4–5, D 4.1. [The description is incomplete, and the mineral is evidently stannite.] 'Silesite' is stated to be a silicate of tin (Sn 55 %) as compact or porous masses somewhat resembling chalcedony. Wood-tin, as a secondary form of cassiterite, is abundant in these veins.

L. J. S.

GORDON (Samuel G.). *Penroseite and trudellite: two new minerals.* Proc. Acad. Nat. Sci. Philadelphia, 1926, vol. 77 (for 1925), pp. 317–324.

Penroseite is a lead-grey mineral with metallic lustre and radiating columnar structure. It is orthorhombic with perfect cleavages (001), (100), (010), and a distinct prismatic cleavage (110); the basal cleavage is curved. Sp. gr. 6.93, H. 3. Microscopical examination of polished surfaces shows the presence of some limonite and silver selenide (?). The mineral dissolves readily in nitric acid. It is easily fusible, colouring the flame azure-blue and emitting reddish-brown fumes; in a bulb-tube selenium is deposited. Analysis by J. E. Whitfield gave: Se 59.80, Ag 2.04, Pb 17.13, Cu 7.84, Ni 11.14, Co 1.34, Fe<sub>2</sub>O<sub>3</sub> 1.08 = 100.37. Approximate alternative formulae are written as 2PbSe<sub>2</sub>. 3CuSe. 5(Ni,Co)Se<sub>2</sub> and PbSe. Cu<sub>2</sub>S. (Ni,Co)Se<sub>3</sub>. The locality of the mineral is probably Colquechaca, Bolivia.

Trudellite occurs with pickeringite, anhydrite, and gypsum in a breccia near Pintados, Tarapacá, Chile. It forms compact masses with amber-yellow colour; sp. gr. 1.93, H. 2½. Optically uniaxial and negative,



$\omega$  1.560,  $\epsilon$  1.495, with indistinct rhombohedral cleavage. Analysis by E. V. Shannon,  $\text{SO}_3$  13.60,  $\text{Cl}$  24.42,  $\text{Al}_2\text{O}_3$  25.67,  $\text{Fe}_2\text{O}_3$  1.00,  $\text{CaO}$  1.56,  $\text{MgO}$  0.66,  $\text{Na}_2\text{O}$  1.58,  $\text{SiO}_2$  0.57,  $\text{H}_2\text{O}$  36.60, total (less O for Cl) 100.17, gives the formula  $\text{Al}_2(\text{SO}_4)_3 \cdot 4\text{AlCl}_3 \cdot 4\text{Al}(\text{OH})_3 \cdot 30\text{H}_2\text{O}$ . The mineral is very deliquescent, and when dissolved in water some of the alumina is precipitated.

L. J. S.

GUIMARÃES (Djalma). *Arrojadita um novo mineral do grupo da wagnerita*. Publicação da Inspectoria de Obras Contra as Seccas, Rio de Janeiro, 1925, no. 58, reprint 11 pp., 1 pl.

A specimen from Serra Branca, Picuhy, Parahyba (NE. Brazil), probably from pegmatite, is massive with dark green colour in small fragments and hardness slightly over 5. Thin sections show a green mineral with inclusions of haematite, quartz, and cassiterite, and alteration products along lines of fracture. The green mineral is monoclinic with perfect prismatic cleavage, optically negative,  $2V$   $71^\circ$ ,  $\gamma$  1.70,  $\gamma - \alpha$  0.007; pleochroism  $\alpha$  and  $\beta$  colourless,  $\gamma$  pale green. One of two analyses is:  $\text{P}_2\text{O}_5$  34.32,  $\text{Fe}_2\text{O}_3$  12.39,  $\text{FeO}$  19.84,  $\text{MnO}$  12.33,  $\text{CaO}$  5.69,  $\text{MgO}$  1.85,  $\text{Na}_2\text{O}$  4.67,  $\text{K}_2\text{O}$  1.45,  $\text{Li}_2\text{O}$  trace,  $\text{H}_2\text{O}$  ( $110^\circ$ ) 0.44,  $\text{H}_2\text{O}$  (over  $110^\circ$ ) 4.96,  $\text{SiO}_2$  0.66,  $\text{SnO}_2$  1.52, total 100.12. Deducting impurities and calculating iron as ferrous, this agrees with W. P. Headen's formula (1891; see Dana, 1892, p. 758)  $4\text{R}'_3\text{PO}_4 \cdot 9\text{R}''_3\text{P}_2\text{O}_8$  for a dark green mineral from Black Hills, South Dakota, which he regarded as a new mineral near triphylite. This is now named arrojadita, and there is no mention of wagnerite in the text.

L. J. S.

GUIMARAES (Djalma). "*Echwegeita*" [i.e. Eschwegeita], *novo mineral encontrado em Minas Geraes*. Boletim do Instituto Brasileiro de Ciencias, 1926, vol. 2, pp. 1-2.

A mineral collected as pebbles in the upper Rio Doce has the appearance of rutile. It is dark reddish-grey on the conchoidal fracture and dark red in thin splinters;  $H$   $5\frac{1}{2}$ ,  $D$  5.87, index of refraction between 2.15 and 2.20, isotropic. Analysis gave  $\text{Ta}_2\text{O}_5$  21.58,  $\text{Nb}_2\text{O}_5$  25.17,  $\text{TiO}_2$  18.75,  $(\text{Y}, \text{Er})_2\text{O}_3$  27.28,  $\text{ThO}_2$  0.57,  $\text{UO}_2$  1.96,  $\text{Fe}_2\text{O}_3$  2.05,  $\text{H}_2\text{O}$  3.09 = 100.45. It is a hydrous tantalum-niobium-titanate of yttrium with very little erbium,  $2\text{Ta}_2\text{O}_5 \cdot 4\text{Nb}_2\text{O}_5 \cdot 10\text{TiO}_2 \cdot 5\text{Y}_2\text{O}_3 \cdot 7\text{H}_2\text{O}$ . In the text it is named 'eschwegeita', after Baron W. L. Eschwege.

L. J. S.

GUIMARÃES (Djalma). *Nota previa sobre um mineral radio-activo*. Boletim do Instituto Brasileiro de Ciencias, 1926, vol. 2, pp. 56-57.

The mineral described occurs as masses of two or more kilograms with samarskite, columbite, and monazite in pegmatite at Divino, city of Ubá,

Minas Geraes. It forms parallel and divergent groups of orthorhombic crystals resembling aeschynite in habit, with the forms (100), (010) and angle (101):( $\bar{1}$ 01) =  $75^\circ$  about. On the sub-conchoidal fracture the colour is dark chocolate to clear maroon with strong resinous lustre. H.  $5\frac{1}{2}$ , D 4.49. The mineral is slightly attacked by sulphuric acid and rapidly by hydrofluoric. Analysis gave  $Ta_2O_5$  12.61,  $Nb_2O_5$  31.53,  $TiO_2$  19.14,  $ThO_2$  2.09,  $(Ce,La)_2O_3$  1.45,  $(Y,Er)_2O_3$  2.18,  $Fe_2O_3$  6.43,  $UO_3$  6.72,  $SnO_2$  0.56,  $PbO$  1.54,  $CaO$  0.36,  $MgO$  0.27,  $H_2O(Ar,He)$  '5.91' [i.e. 15.91] = '100.80'. Gas, 1 c.c. per gram, extracted from the mineral is probably largely helium. The mineral somewhat resembles ampangabeite, but differs from this in containing much more titanium. L. J. S.

HAHN (F.-V. v.). *Cornuit, ein neues, proteinartiges Mineral aus der Kieselgur von Neu-Ohe*. Centralblatt Min., Abt. A, 1925, pp. 353-356; 1926, p. 199.

A yellow gelatinous substance was found in vertical fissures in the diatomite deposit of the Lüneburger Heide, Hanover. In the desiccator it loses 97 % water, and on ignition only 0.08 % ash is left. Various tests prove it to be an albumen, and it is no doubt of fossil origin. [Not the cornuite of A. F. Rogers, 1917.] L. J. S.

KAWAI (Keikichi). *A new mineral "reniforite" from the Yunosawa mine in the province of Mutsu, Japan*. Japanese Journ. Geol. Geogr., [1926], vol. 3 (for 1924), Abstracts p. (15) [from Journ. Geol. Soc. Tokyo, 1925, vol. 32, pp. 106-116. Japanese].

The reniform aggregates have a metallic lustre and are associated with baryte. Sp. gr. at  $15^\circ$  C. 6.451. Analysis gave S 19.44, As 10.32, Sb nil, Pb 69.56, Fe 0.45, total 99.77, and the formula  $5PbS \cdot As_2S_3$  is deduced. [This analysis is within the limits of analyses of jordanite, Min. Mag., vol. 12, p. 287.] L. J. S.

COOPER (R. A.). *Mineral constituents of the Rand concentrates*. Journ. Chem. Metall. Mining Soc. South Africa, 1923, vol. 24, pp. 90-95, 4 figs.; 1924, vol. 24, pp. 264-266.

The heavy minerals separated mechanically from the crushed 'banket' of the Witwatersrand, Transvaal, include besides gold and pyrite, also iridosmine, galena, blende, &c. Analyses showing the presence of a large and varied assortment of elements are given of a 'blue streak' and of a black concentrate. The former consists largely of  $(Co,Ni,Fe)As$ , and the latter contains 49.1 % uranium oxide and is referred to uraninite.



Photomicrographs are reproduced of crystals of iridosmine and of zircon from the concentrates. A specimen subsequently found shows the association of the bluish-white cobalt monoarsenide, which is named 'modderite', with crystals of niccolite. Millerite from a cavity in the reef is also mentioned.

L. J. S.

SCHOEP (Alfred). *Sur l'identité entre la chinkolobwite et la sklodowskite*. Ann. Soc. Géol. Belgique, Liège, 1926, vol. 48, Bull. pp. B 303-B 306.

Examination of a new specimen of chiukolobwite [Abstr., vol. 2, p. 250] from Katanga gave  $\alpha$  1.615, and analysis of the mixed ore after deducting wulfenite 10 %, &c., gave  $\text{SiO}_2$  13.2,  $\text{UO}_3$  69.3,  $\text{MgO}$  3.4,  $\text{H}_2\text{O}$  14.2. These characters, together with those previously determined, agree with those of sklodowskite [Abstr., vol. 2, pp. 341, 384]. As the mineral is not from the Chinkolobwe mine (but from the Kasolo hill) the later name sklodowskite is retained.

L. J. S.

LARSEN (Esper S.) & BERMAN (Harry). *The identity of gilpinite and johannite*. Amer. Min., 1926, vol. 11, pp. 1-5, 2 figs.

A specimen labelled johannite from Joachimsthal, Bohemia, gave optical data ( $\alpha$  1.572,  $\beta$  1.595,  $\gamma$  1.614,  $2V$  near  $90^\circ$ , negative) and goniometric measurements (triclinic,  $a:b:c = 1.218:1:0.6736$ ,  $\alpha$   $69^\circ 24'$ ,  $\beta$   $124^\circ 56'$ ,  $\gamma$   $132^\circ 56'$ ) agreeing with those of 'gilpinite' [Abstr., vol. 1, p. 22]. It is suggested that the data and formula,  $(\text{Cu,Fe,Na}_2)\text{O} \cdot \text{UO}_3 \cdot \text{SO}_3 \cdot 4\text{H}_2\text{O}$ , of 'gilpinite' should be assigned to johannite. [Cf. Abstr., vol. 1, p. 248.]

L. J. S.

### Colour of Minerals.

DOELTER (C.). *Beobachtung über Verfärbung von Mineralien durch Bestrahlung*. Tschermaks Min. Petr. Mitt., 1925, vol. 38, pp. 456-463.

Minerals that have been coloured by radium radiation frequently show subsequent changes in colour after being stored in the dark for several years; and those that had been afterwards decolorized by heat sometimes show a slow return of the colour. Halite, fluorite, and quartz buried for several months in powdered pitchblende showed in some cases very slight colour changes. New observations are recorded for chrysoberyl, topaz, kunzite, hiddenite, apatite, and beryl. The author believes that the colours are due to pigments, and that his colloidal theory is still feasible [Abstr., vol. 1, pp. 227-228].

L. J. S.

PRZIBRAM (Karl) & BĚLAŘ (Marie). *Die Verfärbungen durch Becquerelstrahlen und die Frage des blauen Steinsalzes*. Sitzungsber. Akad. Wiss. Wien, Math.-naturwiss. Kl., Abt. II a, 1924, vol. 132, pp. 262-277, 3 figs.

Colourless rock-salt first made yellow-brown by exposure to radium radiations and then heated at  $200^{\circ}$  acquires a violet colour. This shows the same appearance under the ultramicroscope, and the same thermoluminescent effect with decolorization at  $200-250^{\circ}$ , as the natural violet rock-salt; and it is evident that the colour of the latter is also due to radioactivity. Colourless rock-salt and that coloured blue by heating in sodium vapour show no thermoluminescence. The salt coloured by heating in sodium vapour contains an excess of sodium, whilst in that coloured by radium radiations there has been a transference of electrons from the chlorine ions to the sodium ions.

L. J. S.

LEITMEIER (Hans). *Untersuchungen über die Einwirkung von Radiumstrahlen auf Steinsalz, Flußspat und Quarz*. Tschermaks Min. Petr. Mitt., 1925, vol. 38, pp. 591-598.

Halite when exposed to radium rays acquires a yellowish-brown colour, but this soon fades even in the dark. With the object of testing whether this colour may be due to the presence of impurities, pure sodium chloride was prepared by several recrystallizations from clear rock-salt and from metallic sodium. This purified material still showed the same colour change. The coloration is therefore no doubt due to a change in the material itself; and perhaps, as suggested by K. Przibram (1924), to a separation of electrons from the chlorine ions. All colourless fluorites become cobalt-blue on exposure to radium, but material from different localities varies widely in the rate of the change and in the intensity of the colour produced. A fluorite from Cumberland exposed to a strong radium preparation until it became blue-black was then exposed to sunlight, when it acquired a violet colour, which after five years is still stable. Colourless quartz becomes grey or smoky under the influence of radium, and this colour is permanent to light. To test the suggestion that this colour is due to the presence of sodium silicate (which also is browned by radium), colourless quartz from several localities was heated at  $900^{\circ}$  and  $1100^{\circ}$  (below and above the boiling-point  $1050^{\circ}$  of sodium silicate) and afterwards exposed to radium, together with a piece of the unheated material: the colour change was the same for each of the three fragments, and cannot therefore be due to sodium silicate. It is con-



cluded that in this case also the coloration is due to some change in the material itself and not to the presence of impurities. L. J. S.

STEINMETZ (H.). *Über Fluoritfarbungen*. Zeits. Krist., 1925, vol. 61, pp. 380–388, 10 figs.

Sections cut parallel to the cube-faces of deep-blue fluorite from German localities show zonal bands of colour, parallel to the cube-faces, in colourless material. The width of the bands does not accord with any supposition that the colour is due to radioactivity. Some other distributions of colour and various inclusions in the crystals are also described. [Abstr., vol. 2, p. 359.] L. J. S.

HOLDEN (Edward F.) [1901–1925]. *The cause of color in smoky quartz and amethyst*. Amer. Min., 1925, vol. 10, pp. 203–252, 5 figs.

From observations on the liquid inclusions it is concluded that smoky-quartz crystallized at 101°–220° C. from solutions rich in carbon dioxide. In pegmatites or in Alpine veins it is often associated with radioactive minerals. It is immediately decolorized at 400° and slowly at 235° C., and the colour is restored by radium radiations. (Most quartz becomes brown when exposed to radium.) The small amounts of iron, titanium, and manganese shown by analysis bear no relation to the depth of the colour; whilst uranium ( $\text{UO}_3$  0.001–0.006 %) and free silicon are most abundant in darker specimens. Free silicon was estimated by boiling the finely powdered mineral in aqua regia when colloidal silicic acid passes into solution; the darker specimens gave Si 0.01 %. The conclusion is drawn that the smoky colour is due to the scattering of light by atoms of free silicon, and that these have been set free by the action of radioactive substances. Amethyst has crystallized from aqueous solutions at 90°–250° C.; it is often associated with iron minerals and frequently contains inclusions of goethite and haematite. It is decolorized at 260°, and the violet colour is restored by the action of radium. Darker coloured specimens become yellow when ignited, and then show the same absorption-spectrum as citrine [Abstr., vol. 2, p. 494]. Manganese and titanium are present in only small amounts which do not vary with the depth of colour. The average amounts of  $\text{Fe}_2\text{O}_3$  in specimens free from visible inclusions range with the colour from 0.007 to 0.14 %. The absorption-spectrum of amethyst is similar to those of some ferric compounds, and the colour is like that of ferric ammonium alum. The colour of amethyst is therefore attributed to a ferric compound. The literature is discussed and a bibliography added. L. J. S.

KINOSHITA (Kameki). *On the colour of the anhydrite.* Japanese Journ. Geol. Geogr., [1926], vol. 3 (for 1924), Abstracts p. (13) [from Journ. Geol. Soc. Tokyo, 1925, vol. 32, pp. 9-11].

Analyses of pale bluish crystals from I Hanaoka mine, and II Kanô mine, gave:

	SO <sub>3</sub> .	CaO.	Al <sub>2</sub> O <sub>3</sub> .	FeS <sub>2</sub> .	CO <sub>2</sub> .	Sr, Zn, Cu.
I.	58.26	41.84	0.97	0.11	0.14	nil
II.	57.96	41.46	0.05	0.02	0.17	nil

The colour is gradually lost on exposure to sunlight, and is not explained by the impurities shown in the analyses. From microscopical examination of the anhydrite and experiments with colloidal calcium sulphate, the author concludes that the pale-blue colour is due to the presence of colloidal calcium sulphate in the crystals. L. J. S.

WALKER (T. L.) & PARSONS (A. L.). *Evanescent pink sodalite and associated minerals from Dungannon township, Ontario.* Univ. Toronto Studies, Geol. Ser., 1925, no. 20, pp. 5-13.

A rock containing nepheline, cancrinite, calcite, and little plagioclase occurs as tongues in crystalline limestone. When freshly broken it shows bright pink spots which in bright sunlight fade away in 10-30 seconds, returning again when the material is kept in the dark. The pink isotropic mineral is sodalite, D 2.30, 2.33; analysis I (also Cl 6.82) gives, after deducting CO<sub>2</sub> as cancrinite, the formula 3Na<sub>2</sub>O.3Al<sub>2</sub>O<sub>3</sub>.6SiO<sub>2</sub>.2NaCl. A similar change in colour has been noticed in sodalite from Greenland and India and in hackmanite from Kola; X-rays have no effect on the colour. The glassy white nepheline, with D 2.664,  $\omega$  1.540,  $\epsilon$  1.538, gave analysis II, agreeing closely with the formula (K,Na)AlSiO<sub>4</sub>, there being here no excess of silica. The white massive cancrinite, with D 2.482,  $\omega$  1.524,  $\epsilon$  1.496, gave anal. III, agreeing with the formula CaO.3R<sub>2</sub>O.2Al<sub>2</sub>O<sub>3</sub>.4SiO<sub>2</sub>.CO<sub>2</sub> (H<sub>2</sub>O being reckoned as R<sub>2</sub>O), representing an orthosilicate with part of the silicon replaced by carbon; or as a mixture of orthosilicate and orthocarbonate 2(RO,R<sub>2</sub>O).2Al<sub>2</sub>O<sub>3</sub>.4SiO<sub>2</sub>+2(RO,R<sub>2</sub>O).CO<sub>2</sub>. Closely associated with this rock is a pyroxenic band with tabular crystals of idocrase, with the forms *c u e a m f h* (Dana's letters) and zonal structure—grey inside and deep-brown outside—and D 3.337,  $n$  1.730; anal. IV (also TiO<sub>2</sub> 4.11, F 0.47) is remarkable for the high TiO<sub>2</sub>. The associated pale-green diopside has D 3.278 and gave anal. V. Embedded in bluish crystalline calcite in the same complex are fine large (up to 9 cm.) rhombic-dodecahedra of



hessonite of a deep cinnamon-red colour; D 3.596, anal. VI (also  $\text{TiO}_2$  0.31). Analyses by H. C. Rickaby:

	I.	II.	III.	IV.	V.	VI.
$\text{SiO}_2$ ...	37.08	41.80	35.68	35.76	54.15	38.78
$\text{Al}_2\text{O}_3$ ...	32.53	35.48	30.44	17.56	0.50	20.98
$\text{Fe}_2\text{O}_3$ ...	—	—	—	2.64	0.57	2.94
$\text{FeO}$ ...	—	—	—	2.05	4.01	1.33
$\text{MnO}$ ...	trace	—	—	0.13	0.11	0.62
$\text{MgO}$ ...	0.03	0.13	0.08	1.50	15.95	0.62
$\text{CaO}$ ...	0.50	0.63	8.24	34.34	24.56	33.84
$\text{Na}_2\text{O}$ ...	22.26	14.59	15.69	0.89	0.46	0.40
$\text{K}_2\text{O}$ ...	0.53	6.28	0.78	0.45	0.28	0.34
$\text{CO}_2$ ...	0.32	0.28	6.07	—	—	—
$\text{H}_2\text{O}$ ...	0.67	0.42	3.27	0.58	—	0.20
Total ...	99.26	99.61	100.25	100.48	100.59	'99.94'

L. J. S.

### Pseudomorphs.

LAUBMANN (H.). *Studien über Mineralpseudomorphosen*. (2. Mitteilung). Neues Jahrb. Min., 1921, vol ii, pp. 35-49. [Cf. Abstr., vol. 1, p. 241.]

Various pseudomorphs after pyroxenes were examined microscopically. The material of those from Bilin, Bohemia, usually referred to cimolite after augite [Abstr., vol. 2, p. 306], is stated to consist of scales of kaolin in a siliceous gel. The 'Speckstein' (steatite) and 'serpentine' pseudomorphs after augite from Fassa, Trentino, consist mainly of calcite and celadonite with some chlorite. Talc, however, occurs as a pseudomorph after augite from Dreghorn, Ayrshire. Picrophyll after augite from Sala, Sweden, consists of a mixture of uralite and talc; and rensseleerite from Oxbow, New York, consists of fibrous hornblende and talc. Pseudomorphs of haematite and quartz after pyroxene are described from Tiefengrün, near Hirschberg, Thuringia.

L. J. S.

LAUBMANN (H.). *Studien über Mineralpseudomorphosen*. (3. Mitteilung). Neues Jahrb. Min., 1922, vol. ii, pp. 1-17.

Grey six-sided plates from Pesmada, Trentino, previously described as steatite after brandisite, are now described as prehnite after brandisite. Pseudomorphs of analcime after heulandite from Monzoni, Trentino, are perhaps those previously described as quartz after heulandite. Stilpnomelane after heulandite is also recorded from Monzoni. Orthoclase after analcime and natrolite from Frankenwald, Bavaria. The literature on pseudomorphs of goethite and chalybite after calcite is discussed. The

material of the pseudomorphs often described as goethite after pyrite is usually limonite. Quartz after calcite, baryte, and fluorite; fluorite after calcite; and haematite after chalybite are described from the fluorite veins of Oberpfalz, Bavaria.

L. J. S.

[КРОТОВ (В. П.)] Кротов (Б. П.). О псевдоморфозах по каменной соли из района с. Шеланга—с. Красновидово, в связи с геологией Казанского края.—КРОТОВ (Б.). *Ueber die Pseudomorphosen nach dem Steinsalz aus den Umgebungen von Schelanga-Krasnovidovo im Zusammenhang mit der Geologie von Kazan-Region.* Зап. Росс. Мин. Общ. (Verh. Russ. Min. Gesell.), 1925, vol. 54, pp. 85–108, 4 figs. (Germ. résumé, pp. 107–108).

Empty pseudomorphs after halite, represented by cavities in the dolomite, have the form of small cubes with hopper-shaped depressions on the faces. Other cubes, up to 3 cm. edge, are filled with the clayey dolomite of the enclosing rock. The stratigraphical relations of the dolomite and the origin of the pseudomorphs are discussed. P. N. C.

RICHARDS (Gragg). *Veins with fibrous quartz and chlorite from the vicinity of Providence, Rhode Island.* Amer. Min., 1925, vol. 10, pp. 429–433.

Veins, 1–60 mm. wide, of fibrous quartz traversing graphitic schists have the fibres perpendicular to the walls of the vein. The material varies in colour from pure white to yellowish-green or pale-brown, depending on the amount of admixed chlorite (not actinolite [Abstr., vol. 1, p. 415]). The chlorite has the form of laths 0.002–0.005 mm. thick, 0.015–0.060 mm. wide, and up to 10 mm. long. The optic axial plane is normal to the length and  $Bx_a$  normal to the flat face; 2E small, negative,  $\beta$  1.633. Analysis by H. E. Vassar agrees approximately with the aphrosiderite formula  $6(Mg,Fe)O \cdot 2(Al,Fe)_2O_3 \cdot 4SiO_2 \cdot 5H_2O$ . A small amount of muscovite has the same habit and orientation in the veins. The direction of elongation of the quartz fibres has no definite crystallographic orientation. Quartz has replaced chlorite in these veins, and so acquired a fibrous structure.

L. J. S.

ROSS (Clarence S.) & SHANNON (Earl V.). *The origin, occurrence, composition, and physical properties of the mineral iddingsite.* Proc. U.S. National Museum, 1925, vol. 67, art. 7, 19 pp., 2 pls.

Iddingsite is a red-brown alteration product (pseudomorph) of olivine, and is of wide distribution in basaltic (volcanic and hypabyssal) rocks.



It is distinct from serpentine and has not resulted by weathering processes, being rather a distinct mineral-species and of metasomatic origin during the later stages of the cooling of the magma. The mineral is orthorhombic with perfect cleavages (100), (010), (001), and less perfect (101); optic axial plane (010),  $\alpha \perp (100)$ ,  $2V$   $20^\circ$ – $90^\circ$ , usually negative, but sometimes positive,  $\alpha$  1.608–1.792,  $\beta$  1.650–1.840,  $\gamma$  1.655–1.864,  $\gamma - \alpha$  0.035–0.072. It is brittle, H.  $3\frac{1}{2}$ , D 2.54–2.80. Pleochroism is slight. A linear arrangement of inclusions of magnetite and spinel gives the impression of a fibrous structure, but the material is optically continuous and forms cores in or rims around fresh olivine. The mean of five analyses is  $\text{SiO}_2$  39.11,  $\text{TiO}_2$  0.18,  $\text{Al}_2\text{O}_3$  3.29,  $\text{Fe}_2\text{O}_3$  31.49,  $\text{FeO}$  0.96,  $\text{MgO}$  8.05,  $\text{CaO}$  2.28,  $\text{H}_2\text{O}$  (+  $110^\circ$ ) 8.49,  $\text{H}_2\text{O}$  (–  $110^\circ$ ) 7.78, giving the formula  $\text{MgO} \cdot \text{Fe}_2\text{O}_3 \cdot 3\text{SiO}_2 \cdot 4\text{H}_2\text{O}$ , with  $\text{MgO} : \text{CaO} = 4 : 1$ . Another analysis suggests the formula  $(\text{Mg}, \text{Ca})\text{O} \cdot 5\text{Fe}_2\text{O}_3 \cdot 4\text{SiO}_2 \cdot 10\text{H}_2\text{O}$ , and corresponds with the higher optical values quoted above.

L. J. S.

RINNE (Friedrich). *Gesetzmäßige Verwachsungen von Biotit in Cordierit-pseudomorphosen sächsischer Fruchtschiefer*. Centralblatt Min., Abt. A, 1926, pp. 257–259, 2 figs.

Micro-sections of a spotted slate from the contact zone of the Kirchberg granite show cordierite pseudomorphs with a hexagonal outline and divided into six sectors. In each sector is a plate of biotite with the cleavage-traces parallel to the outer margin, i. e. (001) of the biotite parallel to (010) of the cordierite. The chloritic material of the pseudomorphs probably has the same orientation in each sector.

L. J. S.

HONESS (Arthur P.). *Some interesting chalcedony pseudomorphs from Big Badlands, South Dakota*. Amer. Journ. Sci., 1923, ser. 5, vol. 5, pp. 173–174, 1 fig.

Rosettes of pale bluish-grey chalcedony are found in Oligocene clay: they are probably pseudomorphous after gypsum.

L. J. S.

VAUX (George, Jr.). *Some unusual quartz pseudomorphs from the Hope-well mine, Warwick township, Chester county, Pennsylvania*. Proc. Acad. Nat. Sci. Philadelphia, 1926, vol. 78, pp. 17–19, 3 figs.

Hollow shells of quartz with the form of datolite crystals (up to  $1\frac{1}{2}$  inches across) were found on the dumps of this old magnetite mine;

also quasi-crystals probably representing the spaces between groups of crystals of some mineral.

L. J. S.

### Topographical Mineralogy.

FLINK (Gust.). *Förteckning på Stockholms Högskolas samling av nya eller ofullständigt beskrivna mineral från Långban (fortsättning).* Geol. För. Förh. Stockholm, 1926, vol. 48, pp. 90-93.

The list of new or undetermined minerals from Långban, Sweden, in the collection of the High School at Stockholm is increased to 400 [Abstr., vol. 3, p. 25].

L. J. S.

ZENZÉN (Nils). *Notes on Swedish mineralogy. I-VI. "Odenite", Finbo; chondrodite, Åker; bastnäsite, Bastnäs; linneite, Loos; molybdenite and albite, Sala mine; allanite, Sofiakyrkan, Stockholm,* Geol. För. Förh. Stockholm, 1926, vol. 48, pp. 95-100.

Historical notes on the mineral occurrences mentioned in the title.

L. J. S.

SLAVÍK (František). *Z mineralogie kladenského karbonu a jeho podloží.* [Mineralogy of the Carboniferous and underlying formations of Kladno.] Časopis Národního Musea, Prague, 1925, vol. 99, pp. 112-120.

(1) Zaratite from Dubí and Motyčín.—This forms thin films on acicular crystals of millerite and on the surrounding kaolinite. It has  $n$  1.565 to 1.566 and weak birefringence. Anisotropy was also proved in the zaratite of Texas in Pennsylvania and of Heazlewood in Tasmania, the material in both cases consisting of sphaero-crystals with isotropic portions. The Heazlewood zaratite has  $n$  1.565 in the isotropic portion and  $n$  1.589 in the sphaero-crystals. (2) Stibnite from Prago mine, near Dubí.—The occurrence of stibnite has hitherto been doubtful at this locality: it has been found as radiating groups of imperfect crystals in a small veinlet in the underlying Algonkian. (3) Whewellite from Prago mine, near Dubí.—A new occurrence of whewellite is in the Carboniferous sphaerosiderites of this mine. (4) Baryte from Max mine, near Libušín.—Crystals, *cm d o b n*, filled with coal dust are found in the kaolinitic sandstones. (5) Pyrrhotine.—Crystals  $2\frac{1}{2}$  cm. across from Pchery show the forms  $c(0001)$ ,  $u(20\bar{2}1)$ , and smaller crystals from Motyčín show  $(0001)$ ,  $(10\bar{1}0)$ . The sulphide minerals in the Carboni-



ferous formation are probably of sedimentary origin aided by biochemical processes.

F. S.

KREJČÍ (August) [1856-1925]. *Minerály písecké a jich naleziště*. [The minerals of Písek and their localities.] Časopis Národního Musea, Prague, 1925, vol. 99, pp. 49-65.

The author had been active for more than forty years in collecting and investigating the minerals of the district around Písek. This posthumous paper gives a detailed account of the mineralogical topography. The following new mineral occurrences are described. Collophanite on graphite-bearing gneiss from Čížová; molybdenite from the beryl-bearing pegmatite; hyalite on an actinolite-rock from Písek; pyroxene, phlogopite, brandisite, chondrodite, and zoisite in crystalline limestones from various places in the vicinity of Písek; triplite from the felspar quarry in Havírký.

F. S.

ROSICKÝ (Vojtěch). *Mineralogické zprávy z Moravy*. [Mineralogical notes from Moravia.] Časopis Moravského Musea Zemského, 1926, vol. 22, pp. 138-158, 5 figs., with French résumé.

(1) Dumortierite from Výmyslice, near Moravský Krumlov.—Prismatic aggregates of blue dumortierite occur in small veinlets of pegmatite traversing a fibrolitic gneiss. The pleochroism is strong,  $\alpha$  dark-blue,  $\beta$  yellowish,  $\gamma$  colourless. (2) Pseudomorphs of opal after calcite from near Kosov, east of Jihlava.—The pseudomorphs show the calcite combinations (21 $\bar{3}$ 1), (01 $\bar{1}$ 2) and (30 $\bar{3}$ 1), (01 $\bar{1}$ 2), and occur in veins with quartz, opal, galena, blende, and baryte. Analysis by B. Konečný gave (mean of two) SiO<sub>2</sub> 88.39, Fe<sub>2</sub>O<sub>3</sub> 3.71, Al<sub>2</sub>O<sub>3</sub> 2.64, CaO 0.41, MgO 0.57, P<sub>2</sub>O<sub>5</sub> 0.28, ign. 4.19, total 100.19. (3) Thenardite from Zastávka near Rosice.—Aggregates of small crystals (111) in cavities have been formed by the decomposition of pyrite in coal heaps. (4) Axinite from Rešice.—Imperfect crystals with (1 $\bar{1}$ 0) and (111) [Dana's orientation] in veinlets of a pegmatite, consisting of orthoclase, albite, amphibole, augite, and epidote, in a skarn magnetite ore. (5) Idocrase from Krasonice, near Telč.—Crystals in a contact-metamorphic limestone show the forms *macpi* [Dana] and new *D* (150). (6) Amethyst from Příbor.—Crystals on chalcedony, which forms a bluish-grey crust in cavities in a picritic rock. On the edge (10 $\bar{1}$ 1):(01 $\bar{1}$ 1) the right positive trapezohedron (61 $\bar{7}$ 7) was observed. (7) Smoky-quartz from Dolu Bory.—In pegmatite together with black tourmaline and andalusite; twenty-one crystal-forms are noted.

F. S.

BARIĆ (Ljudevit) & TUĆAN (Fran). *Biljeske o nekim našim mineralima*.  
 Résumé: BARIĆ (Lj.) & TUĆAN (Fr.). *Notizen über einigen Mineralien in Jugoslavien*. Ann. Géol. Pénins. Balkan. Beograd, 1925, vol. 8, pp. 129-134 (Croat.), pp. 134-135 (Germ.).

Rhodocrosite occurs on limonite in the iron-ore district of Ljubija in Bosnia. Analyses are given of I, rosy material with refr. ind.  $n_{Na}$  1.5904; II, light rosy; III, brown.

	MnO.	FeO.	CaO.	MgO.	CO <sub>2</sub> .	Total.	Sp. gr.
I.	60.87	0.77	0.51	trace	38.26	100.41	3.570
II.	57.57	1.70	2.18	0.04	38.53	100.02	3.698
III.	55.09	4.86	1.50	0.14	38.15	99.65	3.668

Greenish-yellow epidote is found in crevices in quartz veins and nests in the green-schists of the Zagreb Mts., Croatia. Analysis gave SiO<sub>2</sub> 37.71, Al<sub>2</sub>O<sub>3</sub> 19.47, Fe<sub>2</sub>O<sub>3</sub> 14.88, FeO 1.18, MnO 0.29, CaO 23.16, MgO 0.17, H<sub>2</sub>O 3.00, total 99.86; sp. gr. 3.4433. Descriptions with chemical analyses are also given of galena, pyrite, and haematite from various localities in Lika, Croatia. Pyrite is found as well-developed crystals (*a e o*), and sometimes as 'iron-cross' twins, in limestones, dolomites, and sandstones at Lisac in Lika.

W. C. S.

NOWACK (Ernst). *Der nordalbanische Erzbezirk*. Abh. prakt. Geol. Bergwirtschaftslehre, Halle (W. Knapp), 1926, vol. 5, 32 pp., 2 pls. (maps), 4 text-figs. Price 4.30 Mk.

—— *Beiträge zur Geologie von Albanien*. Neues Jahrb. Min., 1922-25, Sonderband 1 (4 parts), 493 pp., 30 pls., 27 text-figs. Part 4 (1925, pp. 422-493, 5 pls.) by ROTH VON TELEGD (Karl). *Das albanisch-montenegrinische Grenzgebiet bei Plav*.

This useful pamphlet gives an account of the geology and mineral resources of northern Albania, a region concerning the rocks and minerals of which information has not hitherto been readily available. The mineral occurrences described include: pyrite deposits in the Mirdita district, which appear to be extensive and of economic interest; copper-pyrites deposits at Narel near Kabash, and other localities in the Dukajin district; native copper at Cerpik near Mazarek; iron-ore occurrences in the Dukajin and Luma districts; chromite occurrences in the Kruma and Luma districts; and occurrences of arsenic ores (mispickel, realgar, and orpiment) at Komana near Puka. A useful short bibliography is given, and the illustrations include a geological sketch-map. The second book quoted above gives a detailed account of the geology of certain districts (Malakastra Mts., Elbasan, Tirana and Durazzo and Plava in Montenegro).

T. C.



[CHIRVINSKY (P. N.)] TSCHIRWINSKY (P.). *Beiträge zur Mineralogie Rußlands. I. Teil. Arsen, Pyrit, Markasit, Eisenglanz, Quarz, Chalcedon, Kieselgur, Zirkon.* Zeits. Krist., 1923, vol. 58, pp. 386-403.

A compilation from various papers published in Russian since 1912 [Abstr., vol. 1, p. 327; vol. 2, pp. 31, 71; vol. 3, p. 145]. For pyrite from the Caucasus (43.10.0) and (19.5.0) are doubtful new forms. For zircon from Mariupol, Ukraine,  $a:c = 1:0.64471$ , as the mean of several measurements.

L. J. S.

RANGE (Paul). *Geologie und Mineralvorkommen von Persien.* Zeits. prakt. Geologie, 1926, vol. 34, pp. 49-53, 1 fig. (map).

A brief sketch is given of the topography, geology (Archæan to Pliocene), and mineral resources of Persia. Petroleum is the most important mineral product. Alluvial and vein gold is found. Copper ores are worked at several places in the Kara-Dagh. Cobaltiferous nickel ore is worked at Kashan for the manufacture of smalt. A potash-salt similar to polyhalite is found in the salt deposits at Aran. Ruby and emerald are found near Asterabad, while turquoise has long been known from Nishapur.

L. J. S.

SCHWARZ (V.). *Erzvorkommen und nutzbare Mineralien Afghanistans.* Oesterreichische Chemiker-Zeitung, Wien, 1925, Neue Folge, Jahrg. 28, pp. 186-188.

The lapis-lazuli mines in Badakshan have long been known [no information regarding them is here given]. An important deposit of red-iron-ore 50 metres thick and with 70 % Fe occurs at Jebel-us-Seradji, 75 km. N. of Kabul. Argentiferous galena in the Gorbend valley, 50 km. E. of Bamian. Copper ores (bornite and chalcopyrite) are known at many localities, the largest deposit with 16 % Cu being at Moidan, 36 km. S. of Kabul. There are large sulphur deposits near Mazar-i-Sharif in Afghan Turkestan. Marble is widely distributed and is much used for monumental work. Asbestos of good quality is found in the Chost district; and mica near Djelalabad (Kabul) and Kandahar, and in Waziristan, Kafiristan, and Afridistan. Graphite with the characters of graphitite is found at Argandi, 28 km. S. of Kabul, and good graphite is known at Sa Djenubi in the Chost district. Rock-salt near Tash-Kurghan in Afghan Turkestan. Nephrite near Kandahar. Reef gold has been worked near Kandahar, but the yield is only 5 grams per ton

and alluvial gold is worked by primitive methods in the upper tributaries of the Amur-Darja. There is a large but inaccessible deposit of good coal at Is-Pushta on the north side of the Hindu Kush; and petroleum is known at Tirpul near Herat. Very little is known of the geology of the country (the most important contributions being those of C. L. Griesbach, 1887), and the conditions are not favourable for mining.

L. J. S.

[OBRUCHEV (V. A.)] OBRUTSCHEW (W. A.). *Die metallogenetischen Epochen und Gebiete von Sibirien*. Abh. prakt. Geol. Bergwirtschaftslehre, Halle (W. Knapp), 1926, vol. 6, 64 pp., 1 pl. (map). Price 2 Mk.

The geological history of orogenesis and of igneous activity in Siberia suggests the following metallogenetic epochs: (1) Archaean, (2) Eozoic, (3) Caledonian, (4) Hercynian, (5) Tian-shanian, (6) Mesozoic and Neozoic. The ores and non-metallic minerals belonging to each of these periods are mentioned under the various districts in which they occur. Gold (mostly worked as alluvial) is largely from (2), while (4) is richest in Ag-Pb-Zn-ores. A bibliography of 136 items and indexes of localities and authors are added. A map shows the distribution of the more important deposits.

L. J. S.

WILLBOURN (E. S.). *A list of minerals found in British Malaya together with a description of their properties, composition, occurrences and uses*. Journ. Malayan Branch Roy. Asiatic Soc., 1925, vol. 3, pt. 3, pp. 57-100.

Brief descriptions are given of 75 mineral-species, arranged alphabetically, with notes on the localities where found in British Malaya. Special attention is given to minerals found abundantly as grains in concentrates. Rarer species include brookite, columbite, euxenite, mimetite, pharmacosiderite, stolzite, xenotime, &c. Chrome-ochre occurs as a green clayey coating on boulders of vein-quartz on the Cheroh rubber estate near the Raub gold mine; analysis by J. C. Shenton gave  $\text{SiO}_2$  45.76,  $\text{Al}_2\text{O}_3$  31.60, iron oxide 3.04,  $\text{Cr}_2\text{O}_3$  3.60, CaO trace, MgO 0.50, ign. 15.40 = 99.90, suggesting kaolin with some chromium replacing aluminium. Yellow crystals frequently found in the phosphate deposits of Perlis, and especially in the cave deposit at Gunong Jerneh, are identified as monetite [ $\text{HCaPO}_4$ ]; a partial analysis by J. C. Shenton of crystals coated with gypsum gave  $\text{P}_2\text{O}_5$  38.6 (corresponding with  $\text{Ca}_3(\text{PO}_4)_2$  84.29), iron oxide 0.20,  $\text{Al}_2\text{O}_3$  0.92, ign. 8.80 = 94.21, sp. gr. 2.863.

L. J. S.



HANDEL-MAZZETTI (Heinrich) & KÖHLER (Alexander). *Die in Gwidschou („Kweitschou“) und Hunan gesammelten Gesteine*. Sitzungsber. Akad. Wiss. Wien, Math.-naturwiss. Kl., Abt. I, 1921, vol. 130, pp. 437-446, 1 map, 2 text-figs.

KÖHLER (Alexander). *Die in Yünnan und Südwest-Seitschwan gesammelten Gesteine*. (Mit 1 Kartenskizze und Profilen über ihre Verbreitung von Heinrich Handel-Mazzetti). Ibid., 1923, vol. 132, pp. 291-328, 1 map.

Geological observations were made and rocks collected along the route of a botanical expedition in the provinces Kwei-chow, Hu-nan, Yun-nan, and Sze-chuen, in south-west China. Petrographical descriptions are given of granite, diorite, diabase, tuffs, crystalline schists, and sedimentary rocks.

L. J. S.

*Minerals in Chôsen (Korea)*. Japanese Journ. Geol. Geogr., 1923, vol. 2, Abstracts p. (20) [from Bull. Mineral Survey Korea, 1923, no. 2, 104 pp., published by Geol. Survey Chôsen. Japanese].

All the species of minerals hitherto found in Korea are described under elements, sulphides, silicates, &c., and illustrated by beautiful photographs and crystal figures. Amongst the 114 names listed in the abstract rarer species are petzite, alabandite, stannite, ludlamite. [Cf. Abstr., vol. 1, p. 134.]

L. J. S.

KAWASAKI (Shigetaro). *Mineral resources of South Zenra-dô*. Japanese Journ. Geol. Geogr., 1922, vol. 1, Abstracts pp. (38)-(43) [from Mineral Resources of Chôsen (Korea), Publ. Geol. Survey Chôsen, 1922, no. 13, 111 pp. Japanese.]

The rocks of South Zenra-dô, a province with an area of 4,641 sq. miles in south-west Korea, consist of quartzite, graphite-phyllite, mica-schist, crystalline limestone, &c., intruded by pre-Cambrian grey granite-gneiss; sheared granite and foliated quartz-porphry of unknown age; and Mesozoic sediments intruded by granite, masanite, and diorite. Many assays for gold and silver of the quartz veins show that these are richer in gold when sulphide minerals are present and when the veins occur in the grey granite-gneiss. Compact graphite forms beds 12-18 feet thick in graphite-quartz-sandstone or graphite-phyllite near Kuian (analysis I), and two beds 3 feet thick in chialstolite-graphite-phyllite in the Hinode mine, Kainan-gun (II).

	Fixed carbon.	Volatile matter.	Water.	Ash.	Sp. gr.
I.	73.32	4.86	7.97	13.85	1.902
II.	81.19	3.23	0.89	14.69	2.143

Agalmatolite forms irregular bodies in granophyre and tuff, of which it is an alteration product, and is worked at several places; twelve detailed analyses are given of material ranging from white to black and red in colour. White translucent agalmatolite from Ibam, seen under the microscope to be quite pure, gave  $\text{SiO}_2$  42.53,  $\text{Al}_2\text{O}_3$  42.88,  $\text{Fe}_2\text{O}_3$  0.55,  $\text{MgO}$  0.35,  $\text{CaO}$  trace,  $\text{Na}_2\text{O}$  0.47,  $\text{K}_2\text{O}$  0.02,  $\text{SO}_3$  0.38,  $\text{H}_2\text{O}$  14.57, agreeing with the formula  $3\text{Al}_2\text{O}_3 \cdot 5\text{SiO}_2 \cdot 6\text{H}_2\text{O}$ . At Ibam the agalmatolite is accompanied by pink granular alunite; analysis of a pure sample gave  $\text{SO}_3$  38.02,  $\text{Al}_2\text{O}_3$  37.22,  $\text{MgO}$ ,  $\text{CaO}$  traces,  $\text{K}_2\text{O}$  9.68,  $\text{Na}_2\text{O}$  1.05,  $\text{SiO}_2$  1.38,  $\text{H}_2\text{O}$  13.29. Fine-grained quartz-sand from island beaches is used for glass-making in Japan; four detailed analyses show  $\text{SiO}_2$  94.6–95.9 %.

L. J. S.

KITSON (A. E.). *Outlines of the mineral and water-power resources of the Gold Coast, British West Africa, with hints on prospecting.* Bull. Gold Coast Geol. Survey (London), 1925, no. 1. 56 pp., 13 pls. Price 1s.

— *The mineral resources of the Gold Coast.* Mining Mag. London, 1925, vol. 32, pp. 9–17, 1 fig.

The first-mentioned bulletin is the first of a series of publications in which it is intended to deal with the geology, geography, and mineral resources of the Gold Coast. It gives an outline of the three main mineral industries of the Gold Coast, namely, gold, manganese ore, and diamonds; and deals also with the undeveloped mineral resources of the Colony, including bauxite, which occurs as extensive deposits of high-grade mineral. Remarks are made on the modes of occurrence of minerals in the country, for the benefit of those engaged in prospecting; and a section is devoted to the water-power resources of the Colony. The second article deals more briefly with the subject of Gold Coast mineral resources and prospecting, being the substance of a lecture given to business men in London. Among the mineral occurrences referred to, additional to those mentioned above, are those of cassiterite, arsenopyrite, löllingite, wolframite, scheelite, and molybdenite.

T. C.

FARQUHARSON (R. A.). *First report on the geology and mineral resources of British Somaliland.* London (Waterlow & Sons), 1924, 53 pp., 1 map.

— *Geology and mineral resources of British Somaliland.* Mining Mag. London, 1926, vol. 34, pp. 265–276, 329–340, 12 figs.

An account is given of the physiography, stratigraphy, tectonics, and mineral resources of the British Somaliland Protectorate. The mineral



occurrences referred to include those of coal, lignite, petroleum, galena, salt, mica, beryl, garnet, baryte, celestine, molybdenite, gypsum, gold (doubtful), clay, talc, marble, manganese ore, oil shales, graphite, and diamonds (doubtful). Diamonds have been reported to occur in the south-east of the Protectorate, and prospecting for this mineral has been carried on in the neighbourhood of Kirrit. An examination of this district by the author, however, failed to reveal the existence of any diamantiferous deposits, and the rocks of the Kirrit neighbourhood (Eocene limestone and gypsum) are not such as lead one to expect that diamonds are likely to be found there. T. C.

DIXEY (F.). *Geology and mineral resources of Nyasaland*. Mining Mag. London, 1926, vol. 34, pp. 201-212, 6 figs.

——— *The geological history of Nyasaland*. Bull. Geol. Survey Nyasaland (Nyasaland Times), 1923, no. 2, 4 pp.

A brief account is given of the rock formations of Nyasaland, including the Crystalline Series, the Mafungi Series, the Karroo System, the Dinosaur Beds, and the Lacustrine Series. Reference is made to the basaltic sills and dikes associated with Karroo strata, and to the Great Rift Valley dislocations, of which Lake Nyasa is regarded as a southerly extension. The first-mentioned article gives a summary of information relating to the mineral resources of Nyasaland under separate mineral headings, including graphite, asbestos, talc, mica, corundum, garnet, monazite, coal, strontianite, baryte, gypsum, and bauxite; also ore-minerals of copper, tin, silver-lead, manganese, and iron. T. C.

WALLACE (R. C.). *The mineral resources of Manitoba*. Issued by the Industrial Development Board of Manitoba, Winnipeg, 1925, 48 pp., 1 map, 5 pls., 10 text-figs.

This bulletin gives an up-to-date account of the mineral deposits known to occur in Manitoba, including the pegmatites containing lithium minerals (lepidolite and spodumene) at a locality about 9 miles north-east of Point du Bois. Statistics of mineral production in Manitoba from 1914 to 1924 and a bibliography of economic minerals in Manitoba are included. T. C.

CODAZZI (Ricardo Lleras). *Notas mineralógicas y petrográficas*. Bogota (Biblioteca del Museo Nacional), 1925, 91 pp., 12 pls.

A collection of twenty-two notes, some of which have been previously published [Abstr., vol. 1, p. 334; vol. 3, p. 29], on various minerals, ores, rocks, meteorites, and tektites from Colombia. The 'diamonds' found in 1709 by the Jesuits at Tena were no doubt colourless zircons.

'Viterbite' is the name given to a compact chocolate-coloured or white and powdery amorphous mineral, sp. gr. 1.9, from Santa Rosa de Viterbo, Boyacá; it is decomposed by nitric acid with separation of gelatinous silica, and contains  $\text{SiO}_2$  21.00,  $\text{P}_2\text{O}_5$  6.00,  $\text{Al}_2\text{O}_3$  40.00,  $\text{Fe}_2\text{O}_3$  2.30,  $\text{H}_2\text{O}$  30.70 = 100.00. It is regarded as a compound of eight molecules of allophane and one of wavellite, and is compared with 'trainite' [Abstr., vol. 2, p. 187]. Figures are given of the Santa Rosa and the Rasgata masses of meteoric iron. L. J. S.

SHANNON (Earl V.). *The minerals of Idaho*. Bull. U.S. National Museum, 1926, no. 131, 483 pp., 19 pls., 170 text-figs.

Detailed accounts are given of the occurrences of about 230 mineral-species found in the State of Idaho. In addition to a compilation from the literature and from the author's recent papers [Abstr., vols. 1 and 2], much new information is given, this being largely based on material in the United States National Museum. Many chemical analyses, crystal measurements with drawings of crystals, and optical data determined under the microscope (but no density determinations) are given for various species. Crystal-forms that are apparently new are recorded for anglesite, aragonite, bismuthinite, calcite, erythrite, idocrase, jarosite, linarite, olivenite, pyrite, and wulfenite. Several drawings are given of simple and twinned crystals of cerussite, of which very fine specimens have been found, but unfortunately only few preserved. A list of mining districts is given under counties, and for each mineral-species the occurrences are grouped under counties; this is, however, already out of date, for new counties and boundaries have recently been made. An index of localities is wanting, and the bibliography is not set out for ready reference. L. J. S.

WALKER (T. L.) & PARSONS (A. L.). *New localities for Canadian minerals*. Univ. Toronto Studies, Geol. Ser., 1925, no. 20, pp. 68-71.

A specimen from Cross lake, Cobalt, Ontario, shows chabazite, heulandite, and stilbite; and another, probably also from Cobalt, shows the association of laumontite with native silver and erythrite. Stephanite, proustite, and xanthoconite occur together at the Keeley mine, South Lorrain, Ontario. Crystalline dolomite resembling scoria occurs with celestine at Bagot, Ontario; it has  $D$  2.829,  $\omega$  1.684,  $\epsilon$  1.507, and analysis by H. C. Rickaby,  $\text{CO}_2$  45.55,  $\text{FeO}$  0.66,  $\text{MnO}$  0.12,  $\text{MgO}$  22.07,  $\text{CaO}$  30.68,  $\text{SrO}$  trace,  $\text{H}_2\text{O}$  0.45, insol. 0.23 = 99.76, shows an excess of



bases,  $RO : CO_2 = 1.112 : 1.055$ . Other minerals mentioned are ottrelite, chondrodite, mimetite, epidote, and marcasite. L. J. S.

SIMPSON (Edward S.). *Contributions to the mineralogy of Western Australia. Series 1.* Journ. Roy. Soc. Western Australia, 1926, vol. 12, pp. 57-66.

(1) Lithiophilite; Wodgina.—A detrital boulder weighing over 1 kg. consists of an intergrowth of two crystal individuals of colourless to buff material, D 3.39; analysis gave  $P_2O_5$  45.99, MnO 30.80, FeO 10.44, CaO 2.78, MgO 0.94,  $Li_2O$  7.87,  $Na_2O$  0.34,  $H_2O$  1.11 = 100.27, agreeing with  $(Li,H)_2O \cdot 2(Mn,Fe)O \cdot P_2O_5$ . (2) Leucite; Fitzroy valley.—A volcanic agglomerate filling small plugs consists mainly of small (0.03-0.5 mm.) idiomorphic crystals of leucite, with chlorite, rutile, apatite, and biotite; analysis of the rock shows  $SiO_2$  52.45,  $K_2O$  10.42 %, &c. (3) Ferrimolybdate; Mulgine.—Molybdic-ochre occurs as a pseudomorph after molybdenite in crevices in granite. It is minutely fibrous with straight extinction and strong pleochroism—pale-yellow across the fibre and dark yellowish-green along ( $\gamma$ ) the fibre. The mineral is readily soluble in warm HCl, and is slowly decomposed in ammonia water; D 2.99. Analysis gave  $Fe_2O_3$  17.87,  $MoO_3$  62.90,  $H_2O$  (lost over  $CaCl_2$ ) 10.20,  $H_2O$  (at  $250^\circ$ ) 9.95 = 100.92. Another analysis gave  $Fe_2O_3$  18.29,  $H_2O$  19.25. Water is readily lost and the material changes in colour from picric-yellow, through dark yellow, to olive-green. Formula  $Fe_2O_3 \cdot 4MoO_2 \cdot 5H_2O + 5H_2O$  (as compared with that,  $Fe_2O_3 \cdot 3MoO_2 \cdot 7\frac{1}{2}H_2O$ , of W. T. Schaller, 1907; Min. Mag., vol. 17, p. 350). (4) Kyanite; Chittering valley.—Kyanite is found at several places in quartz veins in gneiss or in biotite-schist. (5) Staurolite; Cullalla.—Associated with the quartz-biotite-kyanite schist is a rock containing quartz, staurolite, biotite, hornblende, muscovite, chlorite, felspar, iron-ore, and zircon; a partial analysis of this rock shows that it approaches granite in composition. The staurolite 'eyes' show an intergrowth with much quartz together with other minerals. The genesis of these kyanite and staurolite rocks is discussed. L. J. S.

### Economic Minerals and Ore-deposits.

OBRUTSCHEW (W. A.). *Über die systematik der Erzlagerstätten.* Abh. prakt. Geol. Bergwirtschaftslehre, Halle (W. Knapp), 1926, vol. 4, 22 pp. Price 2 Mk.

In this pamphlet a brief and very incomplete account is given of the classification of ore-deposits. Reference is made to the more familiar of

the schemes of classification proposed in recent years, including those of De Launay, Beck, Stelzner-Bergeat, Beyschlag-Krusch-Vogt, Lindgren, and Niggli. To these the author adds a scheme of his own, which it is the chief purpose of the pamphlet to describe. In this scheme he calls attention to the importance of geological processes in connexion with ore-deposits, and divides the deposits into three main groups, namely, endogene, exogene, and metamorphogene. As regards its fundamental features, however, his scheme is neither original nor scientifically sound, as he would find if he would make a fuller survey of the literature of the subject.

T. C.

LINDGREN (Waldemar). *Concentration and circulation of the elements from the standpoint of economic geology*. Econ. Geol., 1923, vol. 18, pp. 419-442.

The various geological processes by which metals and other elements are concentrated and diffused in the earth's crust are described. The losses and gains due to sedimentation are tabulated. Biochemical processes and their results are briefly enumerated. Under the heading 'The story of iron', the circulation of iron compounds in the earth's crust is considered in relation to the operation of geochemical processes. Similar stories are told of sulphur and vanadium.

T. C.

UMPLEBY (Joseph B.). *The occurrence of ore on the limestone side of garnet zones*. Bull. Dept. Geol. Univ. California, 1916, vol. 10, pp. 25-37, 10 figs.

In this paper the author calls attention to a spatial relationship between ore and garnet zones in the contact deposits of the North American Cordillera. In many of the deposits the ore-bodies favour the limestone side rather than the intrusive side of the garnet zone. This is shown also by metamorphosed engulfed blocks of limestone, which show ore-impregnated limestone on the inner side of the peripheral mass of garnetized rock. Examples showing this relationship at widely scattered localities in Yukon, Arizona, Idaho, and Mexico are described. Details as to the nature of the ore minerals and of the metamorphism are given. The state of things referred to may be explained by thermal conditions, but the author prefers to explain it as due to a supply of solutions changing in composition in such a way that the formation of lime silicates predominated during the early stages of deposition, while the formation of sulphides predominated during the later stages.

T. C.



KATO (Takeo). *The periods of igneous activity in Japan, with special reference to metallogeny.* Journ. Geol. Soc. Tokyo, 1924, vol. 31, pp. 1-13.

Four important periods of igneous activity in Japan are dealt with in this paper, namely, (1) pre-Cambrian, (2) Palaeozoic, (3) late Mesozoic and early Tertiary, and (4) late Tertiary and Pleistocene. The pre-Cambrian is one of the most important metallogenetic epochs, especially in Korea, where there are extensive haematite-magnetite-schists of the itabirite type. Igneous activity was subordinate in Palaeozoic times, but very extensive and of much significance metallogenetically during the late Mesozoic in both Japan and Korea. Almost all the contact-metamorphic deposits of iron and copper ores found in Japan were formed during the late Mesozoic at or near the contacts between Permo-Carboniferous limestones and granite intrusions. The late Tertiary epoch, which was one of intense volcanic activity, was the most important of all as regards metallogeny in Japan, the distribution of the ore-deposits of this period coinciding with that of the volcanic rocks. Most of the copper veins (including those of the Ashio and Furokura mines), lead-zinc veins, and gold-silver veins in Japan proper were formed at this epoch, and are characterized by propylitization and silicification of the wall-rocks of the veins.

T. C.

KATO (Takeo). *The mineralization in the ore deposits of the Susaki mine in the province of Idzu.* Japanese Journ. Geol. Geogr., 1924, vol. 3, no. 2, pp. 59-69, 1 pl., 5 text-figs.

This paper deals with the mode of formation of deposits of massive pyrite, with special reference to the origin of the deposits of mixed sulphides, known as 'black ore' or 'kuromono', which occur extensively in north-eastern Japan, and which were formed during the Tertiary period [Abstr., vol. 1, p. 53]. The pyritic deposit of Susaki is enclosed in altered augite-andesite, which is as a rule highly silicified along the boundary and passes gradually through more or less pyritized rock into compact pyritic ore at the centre of the ore-body. The formation of the ore-deposit is attributed to hydrothermal action and is regarded as being genetically connected with the propylitization of the andesite of the district. Three stages of mineralization are recognized: (1) silicification with subordinate pyritization; (2) pyritization with subordinate silicification; (3) deposition of galena, blende, baryte, &c. Rock affected only by the first stage of mineralization is known as 'keiko' or 'siliceous ore'; rock affected by the second stage is known as 'oko' or 'yellow ore'; while

rock affected by both the second and third stages, or all three, is known as 'kuromono' or 'black ore'. 'Black ore' is thus a very complex material, containing some chalcopyrite, pyrite, and jasperoid in addition to galena, blende, baryte, and other minerals. The main deposit at Susaki includes the third stage, but the ore is of the yellow type owing to the subordinate development of galena and blende. T. C.

KATO (Takeo). *The cupriferous pyritic ore deposits of the Shibuki and Seki mines in the province of Bungo, Japan.* Journ. Faculty of Science, Imp. Univ. Tokyo, Ser. II Geol. Min., &c., 1925, vol. 1, pp. 65-76, 1 pl., 5 text-figs.

These deposits occur as replacements and impregnations of pyrite and chalcopyrite in epidote-amphibole-schists, along the junction of the latter with intrusive serpentine. The origin of the deposits is attributed to hydrothermal action connected with the intrusion of the serpentine. Evidence is quoted to show that the deposition of the sulphides took place during and towards the end of a metamorphic phase during which the schists were formed, with the accompaniment of orogeny and igneous activity, in late pre-Cambrian times. As regards mode of origin the deposits are typical of the numerous Japanese cupriferous pyritic deposits, most of which, according to the author, are of hydrothermal metasomatic origin, although they are of various geological ages. The author states that none of the Japanese deposits can be regarded as magmatic sulphide injections. T. C.

KATO (Takeo) & OYAMA (Ichiro). *The tourmaline copper veins of the Kan'an mine, South Keishô-dô, Korea.* Japanese Journ. Geol. Geogr., 1923, vol. 2, pp. 11-18, 1 pl., 1 text-fig.

The strata of the Kan'an district are slates of Jurassic age, and are invaded by intrusions of late Mesozoic tonalites and porphyrites. The veins of the district are connected genetically with the tonalite intrusions. The veins in the tonalite are characterized by the presence of magnetite and tourmaline, while those in the slates are characterized by the presence of baryte and abundant chlorite. This difference in the character of the veins, according to the nature of the country-rock, is attributed to differences in the physical conditions, chiefly temperature, prevailing in the wall-rock at the time of deposition. It is reported that the veins in the slate pinch or alter their direction at the contacts with the porphyrite dikes, in which there are stringers and impregnations of sulphides. These facts are regarded by the authors as indicating that the intrusion of the dikes was earlier than the metallization. T. C.



WATANABÉ (Manjirô). *Geological structure of the ore-deposits of the Yakuki and the Ôno mines.* Sci. Rep. Tôhoku Imp. Univ., Ser. 3, 1922, vol. 1, pp. 51-62, 5 figs.

Of the mines referred to, which lie about 17 km. N. of Taira, in the prefecture of Fukushima, the Yakuki is in one of the largest contact-deposits of copper ore in Japan. The rocks of the district are Palaeozoic sediments with intrusive granitic rocks and serpentized peridotite. The ore-deposits may be divided into three groups, according to their geological relations: (1) at contact of granitic rocks with metamorphosed clay-slate; (2) along the base of the main limestone bed; (3) in a calcareous clay-slate containing lenticles of limestone. The chief ore-minerals are chalcopyrite, pyrite, magnetite, pyrrhotine, and blende, with subordinate mispickel and haematite. The chief characteristic skarn minerals associated with the ores are garnet, hedenbergite, ilvaite, and babingtonite.

T. C.

KUHARA (Mikio). *The Natsumé nickel deposits, with special reference to the microscopic investigations of the ores.* Japanese Journ. Geol. Geogr., 1922, vol. 1, Abstracts pp. (5)-(6) [from Mem. Coll. Engin. Kyoto Imp. Univ., 1921, vol. 2, pp. 101-133, 14 pls.].

The deposit is connected with an intrusion of diorite into Mesozoic shales and sandstones; the former being serpentized and the latter baked and silicified near the contact. The ore-minerals belong to two periods and were deposited in the order named: (1) those segregated from the diorite magma are magnetite, pyrrhotine and chalcopyrite of the first generation, niccolite, and rock silicates; (2) those formed by subsequent hydrothermal processes include calcite, mispickel, pyrrhotine and chalcopyrite of the second generation, quartz, pyrite, blende, and galena. The niccolite occurs in spheroids varying from a fraction of an inch to one foot in diameter. A section through the centre of these spheroids shows alternate concentric shells of grey mispickel and reddish niccolite. The niccolite forms radiating prisms, which in a section tangential to the spheroid show polygonal outlines. These prisms are partly replaced and surrounded by mispickel producing a beautiful network. Pyrrhotine and chalcopyrite are intergrown with mispickel in the outer shell of the spheroids. It is supposed that spheroids of radiating niccolite were formed during the magmatic phase, and that these were partly replaced by mispickel during the hydrothermal phase.

L. J. S.

[РҮАТНИТЗКУ (P. P.)] Пятницкий (П. П.). Генетические отношения Криворожских рудных месторождений. II. Железистые роговики и джеспилиты.—РІАТНИТСКУ (P.). *The genetic relations of the deposits of ore in the Krivoy Rog. II. Ferruginous cherts and jaspilites.* Научно-Техн. Отдел В. С. Н. Х., no. 90; Труды Инст. Прикл. Минер. и Металл., Вып. 17 (Sci.-Tech. Dept. Supreme Council of National Economy, no. 90; Trans. Inst. Econ. Mineralogy and Metallurgy, no. 17), Moscow, 1925, 43 pp. (Russian, with English summary, pp. 41-42).

Chert in the form of jaspilite, &c., as distinct from flint, builds up immense stratified deposits (iron-bearing formations) of pre-Cambrian age. The jaspilite and ferruginous chert of Krivoy Rog are regarded by the author as due to direct precipitation in sea-water as a consequence of the mutual precipitating action of the two colloids  $\text{Si}(\text{OH})_4$  and  $\text{Fe}(\text{OH})_3$ , which carried opposite electrical charges. The Krivoy Rog rocks resemble the jaspilites of the Lake Superior region, Scandinavia, Transvaal (calico-rocks), and Brazil (itabirites). The small amount of iron oxide in the flinty rocks of post-Cambrian times, as compared with pre-Cambrian jaspilites, is attributed to the smaller amount of iron and silica carried by river-waters in later geological times. This is explained by the gradual growth of accumulated sediments, and the reduced area exposed to weathering and denudation of the crystalline rocks from which the river-waters obtained their larger supply of iron oxide and silica in early geological times. The author believes that pre-Cambrian river-waters carried about ten times more iron oxide and silica than do the river-waters of the present day. T. C.

GRUNER (John W.). *The origin of sedimentary iron formations: the Biwabik formation of the Mesabi Range.* Econ. Geol., 1922, vol. 17, pp. 407-460, 3 pls., 5 text-figs.

The author gives an account of the geology of the Mesabi Range and considers the origin of the iron-bearing Biwabik formation of Upper Huronian age. He reaches the conclusion that, during Upper Huronian time, and under warm, humid conditions, large areas in North America were occupied by greenstone and basalts. Rock decay was rapid, large amounts of iron oxide and silica passing into solution and being carried to sea in river-waters rich in organic matter. Algae and bacteria as well as inorganic agents caused the precipitation of colloidal iron oxide, silica, and organic matter, largely in the oolitic condition, some of the iron and silica combining to form indefinite amorphous iron silicates. Alteration



of the amorphous material took place during the early stages in the burial and accumulation of the sediment. On deeper burial, ferruginous chert (taconite) originated by the formation of magnetite, amphiboles, and coarse-grained carbonates from the amorphous materials. During later emergence, some of the ferruginous chert changed to ore under favourable conditions of weathering.

T. C.

ICHIMURA (Takeshi). *Koreo-Manchurian pre-Cambrian iron ore deposits and their enriched ore bodies*. Japanese Journ. Geol. Geogr., 1922, vol. 1, Abstracts p. (4) [from Journ. Geol. Soc. Tokyo, 1921, vol. 28, pp. 152-156, 211-220, 240-247, 295-300. Japanese].

Banded and schistose iron-ores of pre-Cambrian age are extensively developed in South Manchuria and Korea. They are quartzose schists or quartzites carrying haematite or magnetite or both, and very similar to the Brazilian itabirite. The mode of occurrence and the chemical and petrographical characters of the deposits and the associated enriched ore-bodies are described in detail. It is supposed that iron was precipitated in shallow seas as hydroxide, carbonate, silicate, &c., partly at least by the action of iron bacteria, and that these sediments were afterwards subjected to intense dynamo-metamorphism and in places to contact-metamorphism.

L. J. S.

COOPER (R. A.). *Platinum specimens from Onverwacht mine*. Journ. Chem. Metall. Mining Soc. South Africa, 1926, vol. 26, pp. 228-230, 2 figs.

The specimens described were obtained by the gravity concentration of crushed chromite-bearing dunite from the Onverwacht mine [Lydenburg district, Transvaal]. Analysis of the chromite showed it to be remarkably constant in composition and gave  $\text{Cr}_2\text{O}_3$  43,  $\text{FeO}$  52,  $\text{MgO}$  5 %. The chromite is highly magnetic and frequently shows polarity. Inclusions of chromite in the dunite are often unusually rich in platinum, yielding 100 dwt. or more per ton. An analysis of picked clear grains of platinum gave Pt 84.75, Pd 0.53, Os-Ir 0.95, Fe 11.98, Ni 0.48, Cu 1.28 %. Numerous perfect crystals of the metal, mostly cubes, are found. Nuggets of platinum up to two grams in weight have been recovered, some of them showing facets.

T. C.

WAGNER (Percy A.). *Preliminary report on the platinum deposits in the south-eastern part of the Rustenburg district, Transvaal*. Mem. Geol. Survey, South Africa, 1926, no. 24, 39 pp., 7 pls., 5 text-figs. Price 2s. 6d.

The geology of the platinum occurrences in the Transvaal has already been fully described by this writer (Abstr., vol. 2, pp. 273, 440; vol. 3,

pp. 44, 75). The present memoir records the discovery of the platiferous Merensky reef on the west side of the Bushveld complex, to the north and east of Rustenburg. The reef has been traced almost continuously for 110 miles along the strike, within the Rustenburg district. As at Lydenburg, the platinum-bearing rock is a variable, diallagic norite with grains of sulphides; and it is held that the sulphides, separating as droplets of matte from the magma, collected the platinum, which afterwards crystallized out within the sulphide aggregates. Individual assays of the reef record as much as 32 dwt. of platinum metals to the short ton. The dunite type of occurrence, which has proved so richly platiniferous at one or two localities in the Lydenburg district, is also found in this area, but so far it has yielded poor assays.

S. J. S.

WYBERGH (W. J.). *The economic geology of Sabie and Pilgrims Rest.* Mem. Geol. Survey South Africa, 1925, no. 23, 124 pp., 5 pls., 18 text-figs. Price 5s. 6d.

This volume is supplementary to memoir no. 5 of the Geological Survey of the Transvaal, 1910, in which the geology of the area was described in detail. The new data are of local economic interest rather than general interest. The gold-bearing quartz reefs are interbedded with shales in the Pretoria, Dolomite, and Black Reef formations, and are considered to be due to replacements effected at certain horizons by circulating water. The reefs are formed of cellular vein-quartz, carrying gold and pyrite or its oxidation products.

S. J. S.

DUPARC (L.). *Sur les filons et les minerais radioactifs d'urane du Portugal.* Compt. Rend. Soc. Phys. Hist. Nat. Genève, 1923, vol. 40, pp. 79-82.

— *Sur le mode de gisement et les propriétés optiques du wolfram de Vizeu (Portugal).* Ibid., 1924, vol. 41, pp. 81-84.

— *Über die Wolfram- und Uran-Erzlagerstätten von Vizeu in Portugal.* Tschermaks Min. Petr. Mitt., 1925, vol. 38, pp. 100-136.

Numerous small and irregular quartz veins with sporadic wolframite occur in muscovite-granite in the district around Bodiosa, 12 km. NW. of Vizeu. Another group of similar veins occurs in pre-Cambrian slates and schists near a granite contact at Tojal, 30 km. NE. of Vizeu. In both these districts cassiterite is absent, but proceeding farther north in Portugal it comes in in increasing amount, finally replacing the wolframite. Usually wolframite is quite opaque, but the mineral from Cabrão in the

Bodioso district is sufficiently translucent to show that the optic axial plane and  $a$  are perpendicular to the cleavage (010) and  $\gamma:c = +21^\circ$ ,  $2V$  large; pleochroism,  $\alpha$  deep red-brown,  $\beta$  red-brown,  $\gamma$  paler red-brown. Analysis of this material gave  $WO_3$  75.52,  $FeO$  5.87,  $MnO$  19.26 = 100.65, showing that it approaches hübnerite. Four other analyses of wolframite from other localities show  $MnO$  17.87—20.29 %. The third paper gives detailed petrographical descriptions with several chemical analyses of the rocks (granite, aplite, gneiss, hornfels), and descriptions of the veins and mines. The veins of uranium ores in the same region are of much the same character and sometimes contain wolframite. Autunite and torbernite occur in crevices in the upper levels, but in the deeper Urgeirica mine a grey-black mineral has been found which is perhaps an alteration product of pitchblende; analysis of this by C. Lepierre gave  $U_3O_8$  5.60,  $Pb$  4.004,  $SiO_2$  64.30,  $Al_2O_3$  9.45,  $Fe_2O_3$  2.38,  $CaO$  3.46,  $S$  2.151, &c.

L. J. S.

MÜHLEN (L. von zur). *Die Lagerstätten von Wolfram, Zinn und Molybdän in Russland*. Osteuropa-Institut in Breslau, Quellen und Studien, Dritte Abt. (Bergbau und Hüttenkunde), Neue Folge, Heft 1. Stuttgart (E. Schweizerbart'sche Verlags), 1926, viii + 96 pp., 13 figs. Price 6.60 Mk.

A detailed digest of recent Russian literature [Abstr., vol. 2, pp. 87–91, 386] dealing with occurrences of wolfram, tin, and molybdenum minerals in Russia and Siberia, especially in Transbaikalia. There is already a small output of wolfram ore in Transbaikalia, and this may be of use for German consumption. Sketch-maps, bibliographies, and an index of localities add to the usefulness of the volume.

L. J. S.

[RUSAKOV (M.)] Русаков (М.). Вольфрамит и молибденит в Киргизской степи.—RUSAKOW (M.). *Wolframit und Molybdenit in Kirgissteppe*. Вестник Геол. Комитета (Botschafter Geol. Komitâts), 1925, no. 2, pp. 47–49, Приложение к т. 44 Изв. Геол. Ком. Ленинград (Beilage z. Bd. 44 Bull. Comité Géol. Leningrad), 1926.

Reference is made to a new find of wolframite in the Kirgiz Steppes at 160 versts SW. of the town of Karkaralinsk, and near the silver-lead deposit of Kuzyo-Adyr. It occurs in quartz-veins in granite, and is associated with tourmaline and small amounts of pyrite, chalcopyrite, galena, and copper carbonates. Molybdenite has been found at Tashchoku, 100–110 versts SW. of Karkaralinsk, where with pyrite and



chalcopyrite it is sprinkled through a quartz-epidote-garnet-rock at a contact of aplite with limestone. P. N. C.

[VARDANYANTZ (L. A.)] Варданянц (Л. А.). К минералогии и петрографии Харанорского Забайкальской области месторождения вольфрамит и шеелита.—VARDANIANZ (L. A.). *Zur Mineralogie und Petrographie von Kharanor'ski in Transbaikalien Lagerstätte von Wolframit und Scheelit*. Изв. Донск. Полит. Инст. Новочеркасск (Ann. Inst. Polyt. Don, Novotcherkassk), 1925, vol. 9 (for 1923-24). pp. 133-161, 9 figs.

Petrographical descriptions are given of a sedimentary conglomerate and its contact with granite, of alkali two-mica-granite, hornblende-granite, and albite-bearing granite-porphry from Kharanor [Abstr., vol. 2, pp. 88-89]. Detailed determinations are given of the feldspars in these rocks. A 'pneumatolytic' mica from a greisen-like rock that carries the wolframite-quartz veins has  $2E\ 61^{\circ}\ 48'$ ,  $2V\ 34^{\circ}$ , and is probably muscovite. The wolframite crystals are tabular parallel to (100): analysis I (also  $P_2O_5\ 0.04$ ,  $H_2O\ 0.08$ ). Scheelite has  $\epsilon-\omega\ 0.0157$ : analysis II (also  $CO_2$  by ignition 0.52).

	$WO_3$	FeO.	MnO.	CaO.	MgO.	$Al_2O_3$	Total.	Sp. gr.
I.	76.13	11.83	11.84	0.06	0.00	0.06	100.04	7.2
II.	79.56	—	—	19.60	0.04	0.01	99.73	5.9

P. N. C.

LINDGREN (Waldemar). *Replacement in the tin-bearing veins of Caracoles, Bolivia*. Econ. Geol., 1926, vol. 21, pp. 135-144.

The veins are referred to as narrow replacement veins, of hypothermal type, traversing a Tertiary quartz-monzonite. The ores consist mainly of cassiterite, tourmaline, chlorite, and quartz, with a small amount of sulphides. Carbonates and pyrite are almost absent. The formation of the ores is attributed to a process of replacement in which there has been a concentration of tin, boron, ferrous iron, and magnesia. This replacement was effected by hypothermal and highly mobile aqueous solutions which traversed the rock along narrow fissures. The hypothermal solutions emanated from the deeper part of the quartz-monzonite. Originally of purely magmatic origin, the solutions rapidly changed as they traversed the rock, taking up the elements of the rock in exchange for iron, tin, and boron, and becoming further diluted when they entered the surrounding slates. The author states that there has been no injection of 'ore magma' in this case. T. C.

KOEBERLIN (F. R.). *Geologic features of Bolivia's tin-bearing veins.*  
Engin. Mining Journ.-Press, New York, 1926, vol. 121, pp. 636-642, 2 figs.

In this paper the author claims to present evidence that only a process of secondary enrichment can account for the origin of many of the Bolivian tin-ore deposits thus far discovered. He states that the solution of cassiterite in the tin veins, and its re-deposition at lower levels, is a natural process of vital economic importance in Bolivia. T. C.

ADAMS (Frank D.). *Note on the origin of the graphite veins of Ceylon.*  
Bull. Canadian Inst. Mining Metall., 1926, no. 168, pp. 496-503, 1 fig. [To be issued later in the Transactions vol. 29 (for 1926).]

In this paper the author deals with the deposit at the Ragedera mine in the Kurunegala district, from which is obtained most of the graphite at present being exported from Ceylon. The Ragedera deposit is of the fissure-vein type, and traverses a quartz-orthoclase-plagioclase-gneiss which usually contains small pink garnets. The vein, which cuts across the foliation of the gneiss, varies in width up to three feet, but at one stage in the workings it opened out to a width of sixteen feet. The vein shows a distinct banding parallel to the walls, the graphite adjacent to the walls having a fibrous form with the fibres arranged at right angles to the wall, while the inner portion of the vein has a foliated or platy texture. A block of vein material from this mine, consisting of a framework of pyroxene with associated graphite, is described and compared with occurrences of somewhat similar pyroxene in the Grenville area of Canada. The various hypotheses that have been put forward to account for the origin of graphite are mentioned briefly but not discussed. It is remarked that the infilling of the Ragedera vein was not a uniform and continuous process. In its earlier stages the process involved the deposition of certain silicates, apatite, &c.; the depositing media then changed, the minerals already formed in the vein becoming altered during the deposition of the graphite. T. C.

BAIN (G. W.). *Magnesite deposits of Grenville, Quebec.* Trans. Amer. Inst. Mining Metall. Engin., 1923, vol. 69, pp. 60-78, 7 figs.

The magnesite-bearing rock of these deposits consists of definite separate carbonates (calcite, dolomite, and magnesite) and not of isomorphous mixtures. The dolomite is finer in grain and more compact than the calcite, while the magnesite is finer in grain than the dolomite. Dolomite is stated to occur as small grains, replacing calcite volume for

volume, while magnesite occurs as small grains replacing dolomite. Replacement of calcite by dolomite is regarded as a necessary preliminary to the formation of magnesite. The deposits are associated with paragneisses rich in ferromagnesian minerals, the whole having been contact-metamorphosed and hydrothermally altered by Laurentian granitic and syenitic magmas. It is thought by the author that the replacing magnesia-bearing solutions were given off by these magmas during their final stages of consolidation. T. C.

NISHIHARA (Hironao). *Magnesite deposits of Manchuria*. Econ. Geol., 1926, vol. 21, pp. 190-194.

The author criticizes a paper on these deposits by K. Niinomy [Abstr., vol. 2, p. 461] and states that the latter attributes the origin of the magnesite to replacement of calcareous rocks by magnesian solutions under the influence of intrusive granite. The author claims, however, that the deposits are bedded and not lenticular, and that they are of primary sedimentary origin. He states that the contact between the magnesite bed and the dolomites above and below is sharp and distinct, and regards this as an indication that the origin of the magnesite is not due to replacement. He thinks it inconceivable that replacement could produce such beds of magnesite without affecting the intervening layers, and regards primary chemical precipitation and later re-crystallization as a much better explanation of the origin of the magnesite. T. C.

MANSFIELD (George Rogers). *Potash in the greensands of New Jersey*. Bull. U.S. Geol. Survey, 1922, no. 727, viii + 146 pp., 10 pls., text-figs.

— *General features of the New Jersey glauconite beds*. Econ. Geol., 1919, vol. 14, pp. 555-567.

— *The physical and chemical character of New Jersey greensand*. Econ. Geol., 1920, vol. 15, pp. 547-566, 1 pl.

The author describes the greensand (glauconitic) marl belt of New Jersey, which extends across the State from near Sandy Hook at the north-east to near Salem at the south-west, a distance of about 100 miles. There are three greensand beds, ranging in thickness from 25 to 40 feet, and estimated to contain about 230 million long tons of potash ( $K_2O$ ) that could be mined opencast. In some places the greensand beds consist of nearly pure glauconite. Details of occurrences and results of drilling are given for different districts. Composite samples were washed, the samples being so prepared as to represent the principal beds



of commercial thickness at each of the localities drilled. The residues were magnetically separated, mechanically graded (sized), and submitted to various determinations. The results of these separations and determinations are discussed, both in their relation to the recovery of potash from greensand and in their bearing on the origin of glauconite. The waters circulating through the marl are slightly potassic and potash is probably being withdrawn from solution, with consequent enrichment of the marl beds, especially as regards the more clayey layers. The author remarks that glauconite is not all formed through the agency of organic matter and refers to F. W. Clarke's suggestion that the formation of glauconite is one of the means by which potash is withdrawn from solution in ground-waters.

T. C.

BAYLEY (W. S.). *Kaolin in North Carolina, with a brief note on hydro-mica*. Econ. Geol., 1920, vol. 15, pp. 236-246.

Kaolin arising from the decomposition of feldspar may be formed either by the action of hot ascending gases or solutions containing fluorine, boron, &c., or by the action of waters of superficial origin containing carbon dioxide and organic matter. The kaolins of the mountain districts of North Carolina are believed to have been formed in the latter way, by the action of water descending along feldspathic dikes. The author states that there is no evidence that the origin of these kaolins is due to gaseous emanations, for the traces of tourmaline and topaz present in them are present also in the unaltered pegmatites, into which the kaolins pass at depths rarely exceeding 100 feet and usually much less. The best kaolin is usually found at about the level of the ground-water. Above this level kaolinization is practically complete; below, the degree of kaolinization diminishes, in some instances so rapidly that the dike material a few feet below ground-water might be used as a source of feldspar. The fact that the dikes are usually richer in kaolin near their foot-walls than near their hanging-walls is explained by the author as due to the protection afforded by the hanging-walls, especially if schistose, against downward-flowing water, whereas the flow of water is more abundant at the foot-walls.

T. C.

MELHASE (John). *Mining bentonite in California*. Engin. Mining Journ.-Press, New York, 1926, vol. 121, pp. 837-842, 6 figs.

The deposits described include those of otaylite near Otay in San Diego Co. and amargosite along the Amargosa River in Inyo Co., California.

Analyses of these two types of bentonite gave the formulae  $\text{MgO} \cdot \text{Al}_2\text{O}_3 \cdot 5\text{SiO}_2 \cdot 8\text{H}_2\text{O}$  for otaylite and  $\text{MgO} \cdot \text{Al}_2\text{O}_3 \cdot 5\text{SiO}_2 \cdot 7\text{H}_2\text{O}$  for amargosite, the latter being the same as the formula for montmorillonite, with which it is regarded as mineralogically identical. Amargosite is commonly known as 'natural soap' or 'soap rock', having been used as a substitute for soap by the Indians. Bentonite usually occurs in areas where beds or incrustations of salts abound (sodium sulphate, carbonate, &c.), and its formation is attributed to the action on beds of volcanic ash of water charged with these salts.

T. C.

SHICHIRI (Sadao) & TACHIKAWA (Masukichi). *Report on the talc deposits, near Hai-Chen, Hung-Tien province.* Japanese Journ. Geol. Geogr., 1922, vol. 1, Abstracts p. (6) [from Chinese Mining Times, 1921, no 53, pp. 1-15, published by the South Manchuria Railway Co. Japanese.]

In the wide area of Cambrian magnesite and dolomite beds near Tah-She-Chiao and Hai-Chen in South Manchuria there are found many talc deposits, some of which are of high-grade quality and in large quantity. The deposits are always found in dolomite and magnesite, but never in pure limestones, and those of better quality are in magnesite rather than in dolomite. The available evidence suggests that they are replacement deposits formed by the action on the carbonate rocks of descending meteoric waters containing silicic acid in solution:  $3\text{MgCO}_3 + 4\text{SiO}_2 + \text{H}_2\text{O} = \text{H}_2\text{Mg}_3(\text{SiO}_3)_4 + 3\text{CO}_2$ .

L. J. S.

FREED (M. L.). *A study of mullite refractories formed by calcining kyanite, their industrial application.* Journ. Amer. Ceramic Soc., 1926, vol. 9, pp. 249-256, 1 fig.

The kyanite used in these experiments was obtained from a deposit in India. It was crystalline and schistose, and contained an abundance of large blue crystals. Small amounts of topaz, pyrophyllite, and corundum were present, together with some interstitial quartz. Over 95% of the material consisted of kyanite. Methods have been devised for converting kyanite into mullite by calcination, and for making refractories from the mullite, using either pure mullite or mullite bonded with clay. These showed a uniform rate of thermal expansion and were proved by laboratory tests to be high-grade refractories.

T. C.

## Miscellaneous.

[CHIRVINSKY (P. N.)] Чирвинский (П. Н.). О фульгуритах. [*On fulgurites.*] Bull. Intern. Acad. Sci. Bohême, 1923, vol. 23 (for 1922), pp. 214-230, 3 figs.

ČIRVINSKIJ (P. N.). *O fulguritech.* Rozpravy České Akad., class 2, 1923, vol. 31 (for 1922), no. 13, 15 pp., 3 figs.

A detailed historical review is given of the researches that have been made on fulgurites. A ramified fulgurite 1.25 metres in length and weighing 200 grams found at Vigurovshchina near Kiev is described, and mention made of some other fulgurites from Ukraine. Artificial fulgurites obtained by the author and A. V. Krukovsky in 1905 are also described and figured (see P. N. Chirvinsky, Zapiski Kiev. Obshchest. Estestv., 1905, vol. 19, p. 139).

F. S.

[CHIRVINSKY (P. N.)] Чирвинский (П. Н.). О находке самородного мышьяка в Ходском руднике Блудикавказского округа в Терекской области. [*On the discovery of native arsenic in the Khodsky mine, Vladikavkaz, Terek province.*] Bull. Intern. Acad. Sci. Bohême, 1923, vol. 23 (for 1922), pp. 237-241.

ČIRVINSKIJ (P. N.). *O nálezu ryziho arsenu v Chodském dole (Vladikavkazský okruh).* Rozpravy České Akad., class 2, 1923, vol. 31 (for 1922), no. 14, 4 pp.

Specimens of native arsenic (sp. gr. 5.78) from the Khodsky mine, Caucasus, show the association with calcite, galena, and blende. The numerous cracks in the material resemble those in dried colloids.

F. S.

[CHIRVINSKY (Vladimir N.)] Чирвинский (В. Л.). О своеобразных надрезах (надплах) кристаллов горного хрусталя с горы Казбек на Кавказе. [*On peculiar incisions in crystals of rock-crystal from Mt. Kazbek, Caucasus.*] Bull. Intern. Acad. Sci. Bohême, 1923, vol. 23 (for 1922), pp. 231-236, with 1 fig.

ČIRVINSKIJ (Vl.). *O zvláštních nákrejích křišťálu z Kazbeka na Kavkaze.* Rozpravy České Akad., class 2, 1923, vol. 31 (for 1922), no. 38, 4 pp., 1 fig.

The incisions penetrating quartz crystals from Kazbek are sometimes of quite irregular orientation, while in other cases they are parallel to the rhombohedra (10 $\bar{1}$ 1) and (01 $\bar{1}$ 1) and perhaps also to the bipyramids



(1121) and (1122). The author supports the view of P. A. Zemyatchensky (1893) that these incisions are the negatives of tabular crystals of calcite, some of which grew in regular orientation with the quartz. F. S.

[BONSHTEDT (E. M.)] Бонштедт (Э. М.). Колумбит из деревни Липовки на Урале. [*Columbite from the village Lipovka in the Ural.*] Изв. Росс. Акад. Наук (Bull. Acad. Sci. Russie), 1925, ser. 6, vol. 19, pp. 513-518, 2 figs.

The small crystals of columbite are tabular parallel to (010) and show the forms  $a$  (100),  $b$  (010),  $c$  (001),  $g$  (110),  $m$  (130),  $v$  (140),  $z$  (150), (160) ?,  $d$  (170), (190) ?,  $l$  (012),  $k$  (011),  $f$  (032),  $h$  (021), (031) ?, (041) ?,  $\gamma$  (141),  $o$  (131),  $u$  (111),  $n$  (211),  $s$  (221). Measurements give the axial ratios  $a:b:c = 0.3936:1:0.35248$ . The crystals contain much manganese; sp. gr. about 5.0. P. N. C.

[GRIGOREV (P. K.)] Григорьев (П. К.). Урановая смолка северной Карелии. [*Uranium pitchblende in northern Karelia.*] Вестник Геол. Комитета (Botschafter Geol. Komitts), 1925, no. 1, pp. 33-34.

Uraninite was found in 1925 at five places in the pegmatite veins of this district in northern Russia. The crystals have the form of cubes, often with faces of the rhombic-dodecahedron or octahedron. In one intergrowth of two cubes each crystal measures 4.2 cm. along the edge. Rounded grains are also found. A preliminary analysis by B. G. Karpov gave  $U_3O_8$  80.63, PbO 12.9, rare-earths 3.2,  $SiO_2$  0.37, CaO 1.2 = 98.30. The pitchblende is usually embedded in plagioclase, rarely in microcline, and very rarely in tourmaline, biotite, muscovite, or garnet. It occurs towards the borders of the veins, which are here more basic than in the centre. [Cf. Abstr., vol. 3, p. 107.] P. N. C.

[КРОТОВ (В. Р.)] Кротов (В. П.). О месторождениях вивианита и о характере включающих его глин в Казанском крае. — Кротов (В.). *Vivianitlagersttten und Charakter der sie einschliessenden Tone im Kazan-Gebiet*. Зап. Росс. Мин. Общ. (Verh. Russ. Min. Gesell.), 1924, ser. 2, vol. 53, pp. 359-383 (Germ. rsum, pp. 382-383).

Occurrences of vivianite in the alluvial deposits of the Volga and Kama rivers in govt. Kazan are described. The mineral is always associated with plant remains, forming a crust on these, or as small radially-fibrous spherules, or again as earthy aggregates of irregular form. The alluvial clays of the Volga consist mainly of felspar and quartz, sometimes with variable amounts of tourmaline, magnetite, ilmenite, haematite, rutile,

glauconite, muscovite, chlorite, apatite, and a small quantity of a plastic clayey material with micaceous character. This peculiar composition is attributed to a re-sorting by streams of fluvio-glacial deposits.

P. N. C.

[SAMOILOV (Y. V.) & ROZHKOVA (E. V.)] Самойлов (Я. В.) и Рожкова (Е. В.). Отложения кремнезема органического происхождения (кремнеземистые биолиты — силлкобиолиты).—SAMOILOFF (J. V.) and ROZHKOVA (E. V.). *Deposits of silica of organic origin (silicobioliths)*. Научно-Техн. Отдел В. С. Н. Х., no. 92; Труды Инст. Прикл. Минер. и Металл., Вып. 18 (Sci.-Techn. Dept. Supreme Council of National Economy, no. 92; Trans. Inst. Econ. Mineralogy and Metallurgy, no. 18), Moscow, 1925, 76 pp., 4 pls., 1 text-fig. (Russian, with English summary, pp. 74-76.)

The authors give the results of their investigation of organic siliceous rocks from many sources, including deposits of diatom ooze now forming on the floors of the Indian Ocean and Lake Baikal, radiolarian ooze from the floor of the Pacific Ocean, and sponge spicules from the Bay of Kola. Solubility tests on different kinds of organic silica showed striking differences, the highest degree of solubility being displayed by diatom frustules, the lowest by sponge spicules. Corresponding tests were made on the solubility of gaizes of Upper Cretaceous and Tertiary ages from many Russian localities, showing that these rocks agree with sponge spicules rather than with diatom frustules in their solubility characteristics. Results are given of investigation of samples from various localities in the Korsun district, Ulyanovsk [formerly Simbirsk] govt., where tripolite merges into gaize and alternates with it, and photomicrographs are shown comparing the textures of gaize and tripolite. As regards their mode of origin, the gaizes are regarded as silicobioliths, and their formation is attributed to biochemical processes. The amorphous silica in the gaize is due to alteration of organic silica originally in the form of sponge spicules, &c. By further alteration gaize passes into chert. Similarly in the case of 'radiolarite', the opaline matrix is not a direct chemical precipitate as some have supposed, but a redistributed form of opaline silica formerly existing as radiolarian skeletons, a more soluble form of silica hydrogel having been replaced by a less soluble form. The authors emphasize the importance of processes operating in the biosphere, remarking that these biochemical processes are not properly appreciated and are sometimes completely ignored by geochemists.

T. C.

KÔZU (Shukusuké) & SUZUKI (Masatoshi). *The influence of temperature on the optic axial angle of adularia, yellow orthoclase and moonstone.* Sci. Rep. Tôhoku Imp. Univ. Sendai, Japan, Ser. 3, 1925, vol. 2, pp. 187-201, 1 pl., 7 text-figs. [Cf. Abstr., vol. 2, p. 372.]

Plates cut perpendicular to the acute bisectrix of these feldspars were heated at various temperatures up to  $1125^{\circ}$  and quickly quenched, and the optic axial angle then measured. The changes of the angle at various temperatures are shown in tables and curves. Laue X-ray photographs are given of moonstone from Korea before heating and after heating to various temperatures [Abstr., vol. 1, p. 314]. L. J. S.

KÔZU (Shukusuké) & SAIKI (Shôichirô). *The thermal expansion of alkali-feldspars.* Sci. Rep. Tôhoku Imp. Univ. Sendai, Japan, Ser. 3, 1925, vol. 2, pp. 203-238, 24 figs. [Cf. Abstr., vol. 2, p. 373.]

Measurements with a differential dilatometer were made on materials (orthoclase, adularia, moonstone, amazonite, and perthite) that had been previously analysed and determined optically [Abstr., vol. 2, pp. 372, 403]. Tables and curves give the expansion at different temperatures up to  $1100^{\circ}$  C. in a direction perpendicular to the basal plane, along the *a*-axis, and along the *b*-axis. The curves show small irregularities, mostly at temperatures at which changes in the optic axial angle had been noted. The greatest expansion is along the *b*-axis. The cooling curves do not coincide with the heating curves. Measurements were also made of the thermal expansion of quartz along the *a*- and *c*-axes. L. J. S.

KÔZU (Shukusuké), SAIKI (Shôichirô), & SUZUKI (Masatoshi). *The thermal expansion and the temperature-influence on the optic axial angle of the moonstone from Ceylon.* Japanese Journ. Geol. Geogr., [1926], vol. 3 (for 1924), nos. 3-4, pp. 39-48, 4 figs.

A re-publication of portions of the two preceding papers.

KAWAI (Keikichi). *Ankerite from Arakawa, Ugo, Japan.* Japanese Journ. Geol. Geogr. [1926], vol. 4 (for 1924), Abstracts p. (14) [from 'Chikyû', 1925, vol. 3, pp. 510-516. Japanese].

Analysis of ankerite from the Arakawa mine gave  $\text{CO}_2$  45.12,  $\text{FeO}$  7.23,  $\text{MnO}$  2.35,  $\text{MgO}$  12.22,  $\text{CaO}$  32.83, insol. trace = 99.75, corresponding with  $6\text{CaCO}_3 \cdot 3\text{MgCO}_3 \cdot \text{FeCO}_3$ . L. J. S.

KINOSHITA (Kameki). *Gypsum crystals from Ishigamori.* Japanese Journ. Geol. Geogr., [1926], vol. 3 (for 1924), nos. 3-4, pp. 113-118, 3 figs.

A deposit of compact gypsum with satin-spar occurs in Tertiary



volcanic tuff, which in contact with the deposit is altered to pale bluish clay, at Ishigamori in Fukushima prefecture. In crevices are clear colourless crystals, up to 25 cm. long, with the forms *abcmgvnl* [Dana's letters]. From the volumes of liquid and gaseous inclusions of carbon dioxide, and from the slight variation with pressure of the transition point ( $63.5^{\circ}\text{C.}$ ) of gypsum to anhydrite, the calculation is made that this gypsum was formed at a depth of less than 64 meters and at a temperature of about  $62^{\circ}\text{C.}$

L. J. S.

KINOSHITA (Kameki). *Preliminary notes on the action of silver nitrate solution on pyrite and marcasite.* Japanese Journ. Geol. Geogr., 1922, vol. 1, Abstracts pp. (6)–(8) [from Journ. Geol. Soc. Tokyo, 1921, vol. 28, pp. 423–431. Japanese].

When boiled in a 3 % solution of silver nitrate, marcasite acquires a brown tarnish, then red, and finally blue, while pyrite is only slightly browned. Small amounts of the mineral pass into solution as ferrous sulphate with the development of free sulphuric acid; the solubility of pyrite being about twice that of marcasite, depending, however, on the size of grain and the conditions of the experiment. The method affords a means of distinguishing pyrite and marcasite, and of estimating their amounts in mixtures.

L. J. S.

WATANABE (Manjirō) & LANDWEHR (W. R.). *On some interesting relations between chalcopyrite and sphalerite in the ores from the Hitachi mine, Japan.* Japanese Journ. Geol. Geogr., 1923, vol. 2, Abstracts p. (19) [from Journ. Geol. Soc. Tokyo, 1923, vol. 30, pp. 1–4].

The lenticular bodies of cupriferous pyritic ores in the Hitachi mine were formed by hydrothermal replacement at the final stage of intense contact metamorphism of amphibolite by intrusions of granodiorite. Examined microscopically under high magnification abundant spots of chalcopyrite are seen as inclusions in crystals of blende. Similar occurrences in America have been ascribed to the replacement of blende by chalcopyrite. It may be supposed, however, that copper and iron sulphides were originally present in solid solution in the blende, and that with a change in the physico-chemical equilibria they separated out as chalcopyrite. In the same ores minute dendritic bodies and skeletal crystals of blende are found in chalcopyrite; these being quite different in form to the blende crystals replacing pyrite sometimes seen in these ores. It is also possible that the blende and chalcopyrite were deposited simultaneously.

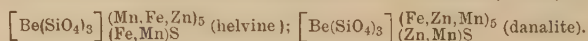
L. J. S.

KOMADA (Ikuro). *Cordierite from Jotsu-ri, Shimo Kisen-men, Kankyo-nando, Korea.* Japanese Journ. Geol. Geogr., 1922, vol. 1, Abstracts p. (19) [from Journ. Geol. Soc. Tokyo, 1922, vol. 29, pp. 120-121. Japanese].

Good crystals of cordierite are found in granite-gneiss at this locality. They are prismatic in habit, 4-5 cm. long and 2-3 cm. wide, and show the forms *abc d* [Dana's letters]. The colour is brown to yellowish-brown and the lustre resinous. L. J. S.

FISCHER (Walther). *El yacimiento de helvina de Casa La Plata en la Sierra de Córdoba (Rep. Argentina). Con una contribución al conocimiento de la constitución de la helvina y danalito.* Bol. Acad. Nac. Ciencias Argentina, Córdoba, 1925, vol. 28, pp. 133-178, 3 pls.  
 — [Abridged translation:] *Die Helvinlagerstätte von Casa La Plata (Sierra de Córdoba, Argentinien).* Centralblatt Min., Abt. A, 1926, pp. 33-42.

Dark-brown tetrahedra (up to 1.5 cm. edge) of helvine occur with fluorite, garnet, &c., in a pegmatite vein which is separated by well-marked contact-zones of idocrase-rock from the enclosing gneiss and marble. The material is optically isotropic, *n* slightly less than 1.740, *H*  $6\frac{1}{2}$ , *D* 3.289; analysis I. Altered helvine as earthy, ochre-yellow crystals gave II. When ignited the mineral gains in weight (3.18 %) owing to oxidation, and water then extracts sulphate of iron and manganese. The fresh mineral is attacked by alkalis and acids. The various formulae that have been proposed for helvine and danalite are discussed; a modification of that suggested by J. Jakob (1920) is adopted:



	SiO <sub>2</sub> .	BeO.	MnO.	FeO.	ZnO.	MgO.	S.	O = S.	Total.
I.	32.65	12.20	30.79	14.75	4.89	2.24	6.01	-2.99	100.54
II.	45.26	7.99	28.34	12.73	3.39	1.67	2.14	-1.07	100.45

The associated garnet is reddish-brown and has the form of rhombic-dodecahedra with optical anomalies; analysis III corresponds with grossular 65.6, spessartine 22.2, and iron-andradite ( $\text{Fe}''_3\text{Fe}'''_2\text{Si}_5\text{O}_{12}$ ) 12.2 %. The idocrase of the contact-zone forms grey-green prisms with birefringence 0.004-0.005. Analysis IV (also Na, K, P<sub>2</sub>O<sub>5</sub>, F not determined) of material mixed with some garnet,

	SiO <sub>2</sub> .	TiO <sub>2</sub> .	Al <sub>2</sub> O <sub>3</sub> .	Fe <sub>2</sub> O <sub>3</sub> .	FeO.	MnO.	MgO.	CaO.	H <sub>2</sub> O.	Total.
III.	40.49	—	19.48	3.43	2.88	9.51	—	24.45	—	100.24
IV.	37.19	1.05	20.99	3.98	1.95	0.72	1.26	29.86	1.87	—

L. J. S.

BUTTGEBACH (H.). *Notes cristallographiques. Note sur l'aurichalcite. Description de cristaux de danburite. Cristaux de céruosite de Tunisie. Cristaux de quelques composés organiques.* Mém. Soc. R. Sci. Liège, 1924, ser. 3, vol. 12, no. —, 25 pp., 13 figs.

A review is given of the literature on the crystallography and optics of aurichalcite. Crystals of danburite, presumably from Mt. Scopi, Switzerland, show the forms  $bnl\lambda rd$  [Dana's letters], and on one crystal a large face  $f(3.20.2)$ . Twinned groups of cerussite from Slatá, Tunisia, are figured. Crystallographic constants are given for derivatives of cotarnine ( $C_{12}H_{15}NO_4$ ), and for cyclic organic compounds of tin. L. J. S.

CESÀRO (G.). *La valentinite accompagnant la nadorite à Djebel-Nador. Étude des formes de la « valentinite » des autres localités.* Mém. (in-8°) Acad. Roy. Belgique, Cl. Sci., 1925, vol. 8, fasc. 4, 57 pp., 8 figs.

Measurements of crystals of valentinite, occurring with nadorite and cerussite at Jebel Nador, Algeria, gave  $a:b:c = 0.39522:1:0.43417$ , from the angles  $(110):(111) = 40^\circ 15'$  and  $(111):(1\bar{1}1) = 32^\circ 35'$  [cf. Min. Mag., 1907, vol. 14, p. 329]. On one crystal are also the prisms  $(510)$ ,  $(720)$ ,  $(17.5.0)$ ,  $(210)$ ; and on another  $(100)$  and a new pyramid  $s(15.36.40)$ . Indirect calculations are given of the optical constants. Previous papers on the crystallography of valentinite are discussed, and it is concluded that crystals from other localities cannot be referred to the same parameters owing to the presence of certain faces with high indices. [The same would also apply to the forms  $(17.5.0)$  and  $(15.36.40)$ .] L. J. S.

PEREIRA-FORJAZ (A.). *Étude spectrographique des minéraux portugais de tungstène.* Compt. Rend. Acad. Sci. Paris, 1921, vol. 173, pp. 1170–1171.

Tungsten minerals—wolframite, ferberite, and scheelite—are widely distributed in northern Portugal. A list of localities is given. Spectroscopic analysis of wolframite from Borralha showed the presence of W, O, Fe, Mn, Ca, Sr, Ti, Na, Cr, but no tin. L. J. S.

ORCEL (J.). *Sur la détermination des températures de départ de l'eau dans les silicates.* Compt. Rend. Acad. Sci. Paris, 1924, vol. 179, pp. 1056–1059, 1 fig.

The powdered mineral, contained in a platinum crucible, is placed at the bottom of a vertical tube ( $17 \times 3$  cm.) of silica-glass, which contains a thermo-electric couple and is surrounded by an electric furnace. A three-way cock enables the tube to be connected with either an air-pump



or a manometer. By conducting the experiment in vacuo oxidation is eliminated. Plotting temperatures against pressures, a curve is obtained which shows whether the water is given off continuously or mainly at a definite temperature.

L. J. S.

KRANCK (E. H.). *Om en gadolinitförekomst vid Lövböle i Kimito (S. V. Finland)*. Acta Academiae Aboensis Mathematica et Physica, 1924, vol. 3 (reprint 16 pp., 1 pl., 1 text-fig.).

The minerals collected in a felspar quarry in pegmatite at Lövböle are briefly described. They include microcline, quartz, albite, biotite, muscovite, garnet, gadolinite, pyrite, pyrrhotine, chalcopyrite, and ilmenite. The gadolinite occurs as pitchy-black crystals ( $\frac{1}{2}$ –6 cm.) and compact masses (10 cm.) and shows the forms *cbqmpok* [Dana's letters]. In thin section it is mainly dark-green and isotropic ( $n$  1.77), with veins and patches of reddish-brown and colourless gadolinite showing weak birefringence. Analysis gave:  $\text{SiO}_2$  23.53,  $\text{ThO}_2$  0.60,  $\text{Y}_2\text{O}_3$  &c. 46.71,  $\text{Ce}_2\text{O}_3$  &c. 2.82,  $\text{Fe}_2\text{O}_3$  0.69,  $\text{Al}_2\text{O}_3$  1.20,  $\text{BeO}$  8.81,  $\text{FeO}$  13.50,  $\text{MnO}$  trace,  $\text{CaO}$  0.90,  $\text{MgO}$  0.02,  $\text{Na}_2\text{O}$  0.15,  $\text{H}_2\text{O}$  0.31, S 0.88 = 100.12. Sp. gr. 4.208.

L. J. S.

HEDVALL (J. Arvid). *Om det termiska sönderfallet hos järnspat, manganspat och dolomit*. [On the thermal decomposition of chalybite, rhodochrosite, and dolomite.] Geol. För. Förh. Stockholm, 1925, vol. 47, pp. 73–80, 5 figs. [Cf. Abstr., vol. 3, p. 59.]

Two methods were employed: (1) Time-temperature curve when the material was slowly heated up in an electric oven. (2) The material was heated up in a current of nitrogen and the evolved carbon dioxide absorbed by barium hydroxide solution. Chalybite begins to decompose at  $195^\circ$ , and at about  $490^\circ$  the dissociation pressure has reached one atmosphere. For rhodochrosite the corresponding values are  $435^\circ$  and  $540^\circ$ . The heating-curve of dolomite shows breaks at  $580^\circ$ ,  $623^\circ$ ,  $640^\circ$ ,  $675^\circ$ , and  $910^\circ$ . The last of these corresponds with the dissociation pressure of 1 atmos. of  $\text{CaCO}_3$  (J. A. Hedvall, 1916), and it is concluded that free  $\text{CaCO}_3$  is present, due to the reaction  $\text{CaO} + \text{CaMg}(\text{CO}_3)_2 = 2\text{CaCO}_3 + \text{MgO}$ .

L. J. S.

SUNDIUS (N.). *Über die Karbonate der mittelschwedischen manganreichen Skarn-Karbonaterze*. Tschermaks Min. Petr. Mitt., 1925, vol. 38, pp. 175–194, 1 fig.

The Swedish 'skarn' ores consist of compact mixtures of magnetite and haematite with silicates of Ca, Fe, Mn, Mg. Carbonates are also present in variable amounts, and in central Sweden much manganese. Several analyses are given of the carbonate portions of these ores,

together with determinations of the specific gravity and the refractive index  $\omega$ . These values when plotted in three series,  $\text{CaCO}_3\text{—MnCO}_3$ ,  $\text{CaMg}(\text{CO}_3)_2\text{—Ca}(\text{Fe,Mn})(\text{CO}_3)_2$ , and  $\text{MgCO}_3\text{—FeCO}_3$ , fall along straight lines.

L. J. S.

SUNDIUS (N.), with analyses by A. BYGDÉN. *Zur Kenntnis der monoklinen Ca-armen Amphibole (Grünerit-Cummingtonit-Reihe)*. Geol. För. Förh. Stockholm, 1924, vol. 46, pp. 154–167, 1 fig.

Monoclinic amphiboles poor in calcium belonging to the grünerite-cummington series,  $(\text{Fe,Mg})\text{SiO}_3$ , are of frequent occurrence as gangue minerals and in the skarn of the Swedish ore-deposits. About 10% MnO is usually present. New analyses and data are given for some of these (dannemorite, silfbergite, &c.); and it is shown that they form a continuous series from grünerite (70 mol. %  $\text{FeSiO}_3$ ) to 60 mol. %  $\text{MgSiO}_3$ . The refractive indices, birefringence, and sp. gr. increase with the amount of iron, whilst the extinction-angle  $\gamma:c$  shows a decrease. For pure grünerite ( $\text{FeSiO}_3$ ) is deduced  $\alpha$  1.681,  $\gamma$  1.726, sp. gr. 3.561. L. J. S.

CARSTENS (C. W.). *Cummingtonit fra Saude, Ryfylke*. Norsk Geol. Tidsskrift, 1920, vol. 5, pp. 351–357, 1 fig.

Yellow-brown, acicular to columnar cummingtonite forms the gangue of blende in the Saude zinc mine. It has sp. gr. 3.23,  $\beta$  1.646,  $\gamma - \alpha$  0.025,  $c:\gamma = 20^\circ$ ,  $2V$   $82^\circ\text{--}84^\circ$ , and analysis by O. Røer gave:  $\text{SiO}_2$  54.20,  $\text{TiO}_2$  nil,  $\text{Al}_2\text{O}_3$  2.08,  $\text{Fe}_2\text{O}_3$  nil,  $\text{FeO}$  22.09,  $\text{MnO}$  0.16,  $\text{MgO}$  19.20,  $\text{CaO}$  trace,  $\text{Na}_2\text{O}$  0.20,  $\text{K}_2\text{O}$  0.16,  $\text{H}_2\text{O}(+110^\circ)$  2.05, total 100.14. In thin sections it shows twin-lamellae parallel to (100). The composition and characters of cummingtonite, grünerite, and anthophyllite are compared.

L. J. S.

PALMUNEN (M. K.). *Ett sjöskumlikt mineral från Kiirunavaara*. [A meerschaum-like mineral from Kiirunavaara.] Geol. För. Förh. Stockholm, 1926, vol. 48, pp. 94–95.

A light and compact, white or pale-yellowish mineral, resembling meerschaum or serpentine in appearance, is of sparing occurrence as a secondary filling in crevices in the iron ore. Analysis gave  $\text{SiO}_2$  42.57,  $\text{Al}_2\text{O}_3$  0.91,  $\text{Fe}_2\text{O}_3$  4.32,  $\text{CaO}$  1.90,  $\text{MgO}$  32.99,  $\text{H}_2\text{O}$  16.83 = 99.52. Deducting impurities, this gives the formula  $7\text{MgO} \cdot 6\text{SiO}_2 \cdot 8\text{H}_2\text{O}$ .

L. J. S.

GEIGER (Per). *Notes on the crystals described as "prolectite"*. Geol. För. Förh. Stockholm, 1926, vol. 48, pp. 86–89.

The mineral norbergite [Abstr., p. 110] having the same formula,  $\text{Mg}_2\text{SiO}_4 \cdot \text{Mg}(\text{F,OH})_2$ , as that assumed for prolectite (H. Sjögren, 1895), a re-examination was made of the original crystals of the latter from

Nordmarken. The optical data ( $\alpha$  1.623,  $\beta$  1.637,  $2V$   $81^{\circ} 40'$ ) for this 'prolectite' differ from those of norbergite, but are in agreement with those of chondrodite. The distinction was based on unsatisfactory goniometric measurements, and it is probable that 'prolectite' is identical with chondrodite.

L. J. S.

RAAZ (Franz). *Trachtstudien am Orthoklas*. Tschermaks Min. Petr. Mitt., 1925, vol. 36, pp. 321-356, 1 pl. [= p. 330], 5 text-figs.

Variations in the habit of orthoclase crystals are studied, and tables of measurements are given of the distances of the several faces from the centre of the crystal for three types of adularia and three types of pegmatitic orthoclase from various localities.

KALB (Georg) & MEYER (Emil). *Die Nickel- und Kobaltführung der Knottenerzlagertätte von Mechernich*. Centralblatt Min., Abt. A, 1926, pp. 26-28, 2 figs.

A mineral found in crevices in conglomerate at Mechernich, Eifel, is steel-grey in colour, but with yellow tarnish, and shows the forms of the pentagonal-dodecahedra (750) and (320); analyses I and II agree with  $(\text{Ni, Fe, Co})\text{S}_2$ . The crystalline crust passes into a yellow mineral; anal. III. Polished sections of grains from another ore sample show a zonal intergrowth of the steel-grey and yellow minerals, with sometimes an outer zone of galena. The steel-grey mineral is referred provisionally to bravoite, and the yellow one to the cobaltnickelpyrite (of V. I. Vernadsky, 1910). They probably are members of a series of mixed crystals  $\text{FeS}_2-(\text{Ni, Co})\text{S}_2$ .

	S.	Co.	Ni.	Fe.	Cu.	Insol.	Sp. gr.	Hardness.
I.	51.15	3.28	24.73	17.08	0.47	0.40	4.62	$5\frac{1}{2}$ -6
II.	51.00	3.32	24.28	17.44	0.23	—	—	—
III.	50.77	trace	4.40	38.02	2.80	2.50	—	6

L. J. S.

JAHN (A.). *Wolframitkristalle aus dem Vogtland*. Mitt. Vogtl. Gesell. Naturfor., Plauen, 1926, no. 3, pp. 1-9, 1 pl.

— Die Mineralien der Wolframitgänge von Tirpersdorf. i. B. Ibid., pp. 10-14.

Wolframite is found in Vogtland in two districts: (1) in tourmaline-bearing quartz-veins in the outer contact-zone of the Bergen-Lauterbach granite, where it has been mined to a small extent; and (2) in the topaz-rocks of the Schneckenstein near the Eibenstock granite. Crystals are described from Tirpersdorf, Eich near Treuen, Schneckenstein, and Gottesberg. Five types of habit are distinguished and nineteen crystal-forms noted, including a new form  $p(541)$  [Des Cloizeaux's and Dana's



axes]. Crystals from Gottesberg show heart-shaped twins on (023) and less often tabular contact-twins on (100). Analyses of the wolframite from Tirpersdorf give the formula  $5\text{FeWO}_4 \cdot \text{MnWO}_4$ ; sp. gr. 7.23. Wolframite from Schneckenstein has sp. gr. 7.49.

The second paper gives brief descriptions of thirty minerals found in the wolframite veins of Tirpersdorf. These include wolfram, bismuth, and molybdenum minerals, &c.; scheelite rare, and cassiterite absent.

L. J. S.

REUNING (E.). *Gediegen Schwefel in der Küstenzone Südwestafrikas*. Centralblatt Min., Abt. A, 1925, pp. 86-94, 1 fig.

Small deposits of earthy native sulphur mixed with iron hydroxides and gypsum are found in the Namib desert east of Swakopmund. They are associated with crystalline schists and marble containing pyrrhotine and pegmatites containing pyrites. At the present day the weathering of these sulphides gives rise to only iron hydroxides and gypsum. The sulphur was probably formed at some earlier period when lagoons, containing organic matter and bacteria, occupied the surface. In the present-day lagoons and bays on the coast there is an abundant development of hydrogen sulphide (no doubt derived from sulphides in the underlying rocks) and native sulphur impregnates the sand-bars of Walfish Bay.

L. J. S.

DITTLER (E.). *Neue Mineralanalysen*. Tschermaks Min. Petr. Mitt., 1924, vol. 36, pp. 213-216.

Talc from Sirwan, Armenia.—A compact, pale yellowish-green mineral, thought to be 'agalmatolite', sp. gr. 2.832,  $n$  1.554, gave ratios  $\text{H}_2\text{O} : \text{RO} : \text{SiO}_2 = 1 : 2.5 : 3$ , near to those of talc. Damourite from Mt. Lyell, Tasmania.—Compact, pale greenish material translucent at the edges and consisting of an aggregate of fine scales has sp. gr. 2.872; from anal. I (mean of two) is calculated muscovite ( $\text{KH}_2\text{Al}_3\text{Si}_3\text{O}_{12}$ ) 98.07 and fayalite ( $\text{Fe}_2\text{SiO}_4$ ) 1.93 mol. %. Felspars from Lower Austria.—These are from a felspar quarry in pegmatite between Krems and Gföhl. Microcline-perthite has sp. gr. 2.558 and extinction on (010)  $8^\circ$ ; anal. II gives  $\text{Or}_{63.10} \text{Ab}_{31.90}$ . Albite as bluish-white cleavage masses has sp. gr. 2.625 and extinction on (010)  $19^\circ$ ; anal. III gives  $\text{Ab}_{98.14} \text{Or}_{1.86}$ .

	$\text{SiO}_2$	$\text{Al}_2\text{O}_3$	$\text{Fe}_2\text{O}_3$	$\text{FeO}$	$\text{CaO}$	$\text{K}_2\text{O}$	$\text{Na}_2\text{O}$	$\frac{\text{H}_2\text{O}}{(-110^\circ)}$	$\frac{\text{H}_2\text{O}}{(+110^\circ)}$	Total.
I.	43.37	39.03	0.40	1.41	—	10.98	0.75	0.76	3.80	100.50
II.	64.20	20.55	0.14	—	trace	11.26	3.48	—	0.28	99.91
III.	66.80	20.94	—	—	trace	0.34	11.91	—	0.10	100.09

L. J. S.

DITTLER (E.). *Manganführende Flußgerölle*. Tschermaks Min. Petr. Mitt., 1924, vol. 36, pp. 164-169.

'Shiny pebbles' from the bed of the Vistula have a thin (1-2 mm.) black coating of iron and manganese hydroxides, the smooth surface having a metallic lustre. This is shown only by porous stones, such as sandstone and the harder chalk-marl, and not by compact limestone, granite, and flint. It is suggested that the manganese has been deposited from the river-water. Experiments were made on the adsorption of manganese from a solution of manganese hydrogen carbonate by quartz, &c. Quartz sand took up 51.74 % of the manganese from the solution, kaolin 68.73, compact limestone 72.90, marl 78.53, and precipitated chalk 96.53 % (in the last case there being probably also some chemical replacement). [Cf. Abstr., vol. 1, p. 399; vol. 2, p. 379.]

Black coated pebbles from the Enns in Upper Austria are quite different in character. Here the thin (1-2 mm.) skin is dull on the surface. These pebbles consist of mangandolomite, and by the oxidation and hydration of the manganese carbonate dendrites have been formed in the outer zone leading to an accumulation of manganese hydroxide on the surface.

L. J. S.

HLAWATSCH (K.). *Mineralogischen Notizen I-III*. Ann. Naturhist. Mus. Wien, 1925, vol. 38, pp. 15-19, 1 fig.

A crystal of wulfenite from Mies, Carinthia, is figured, suggesting that it is hemimorphic and twinned on (001); forms  $nem\delta f\zeta$  [Dana], with re-entrant angles formed by  $e$  and  $\zeta$  at the girdle of the crystals. Linarite and caledonite are recorded from Oberzeiring, Styria; and anglesite from Schwarzenberg, Tiurnitz, Lower Austria.

L. J. S.

SCUTT (Walter). *Germanium in a British mineral*. Phil. Mag., 1926, ser. 7, vol. 1, pp. 1007-1009, pl. XVI A.

Massive blende from near Devil's Bridge, Aberystwyth, examined spectroscopically, showed the presence of about 2 to 4 % germanium. Blendes from Cornwall, Cumberland, and Derbyshire showed traces of gallium, indium, thallium, and cadmium.

L. J. S.

SHANNON (Earl V.). *Mineralogy of the chrome ore from Etchison, Montgomery Co., Md.* Amer. Min., 1926, vol. 11, pp. 16-20.

A bulk analysis of the ore (sp. gr. 3.43) shows  $Cr_2O_3$  20.56 % &c. Deducting serpentine 30.18 and margarite 10.13 % [Abstr., vol. 2, p. 364], the composition of the chrome-spinel is deduced as  $Al_2O_3$  21.80,  $Cr_2O_3$  34.95,  $Fe_2O_3$  16.13,  $FeO$  14.51,  $MgO$  13.19.

L. J. S.

# MINERALOGICAL ABSTRACTS

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## Notices of Books.

MICHEL (Hermann). *Die künstlichen Edelsteine. Eine zusammenfassende Darstellung ihrer Erzeugung, ihrer Unterscheidung von den natürlichen Steinen und ihrer Stellung im Handel. Mit je einem Abschnitte über Verfälschungen der Edelsteine und über Perlen.* 2nd edit., Leipzig (Wilhelm Diebener), 1926, viii + 477 pp., 2 col. pls, 180 text-figs. Price 25 Mk.

This book, the first edition of which appeared in 1914, gives a detailed and useful summary of the scientific and technical literature dealing with the artificial production of minerals that have been used as gem-stones. Most of the gem-minerals, with the notable exceptions of tourmaline and turquoise (of which, however, there are good imitations in copper-coloured aluminium phosphate), have been prepared artificially. But it is only corundum of various colours, and to a much smaller extent spinel, prepared by the Verneuil process, that have been produced commercially and with striking success. These are now produced in large quantities at Bitterfeld in Prussia, Locarno and Bözlingen near Biel in Switzerland, and at Terni in Italy. The amounts of production are only vaguely stated. The German works can supply up to five million carats (1000 kg. or about a ton) a month. The influence of this on the price and sale of natural ruby and sapphire is discussed. The means of distinguishing artificially and naturally produced stones are fully explained. These depend on small differences in the unessential characters, principally microscopical structures in the stone; and the author has devised further methods based on colour and luminescent effects [Abstr., p. 190]. Imitation and counterfeit gems are considered, and also pearls that have been grown under controlled conditions. Some of the matter and illustrations have already been published by the author in a series of articles in the 'Deutsche Goldschmiede-Zeitung'. The book is well printed and illustrated and makes an attractive volume. L. J. S.



AMBRONN (Hermann) & FREY (Albert). *Das Polarisationsmikroskop, seine Anwendung in der Kolloidforschung und in der Färberei. Kolloidforschung in Einzeldarstellungen*, vol. 5, Leipzig (Akademische Verlagsgesellschaft), 1926. x + 195 pp., 1 col. pl., 48 text-figs. Price 12 Mk. (bound 13.80 Mk.).

This gives an introduction to optics so far as needed for the microscopical examination in polarized light of colloidal substances, and deals in particular with the various methods for determining the strength of the double refraction. The double refraction may be due: (1) to the parallel aggregation of rods or scales ('Formdoppelbrechung') when the size of the particles and the spaces between them are comparable with the wave-length of light. Here the strength of the double refraction varies with the index of refraction of the liquid in which the particles are immersed. (2) The double refraction may be peculiar to the material ('Eigendoppelbrechung'), as in chitin, vegetable fibres, &c. (3) Accidental double refraction, as in deformed gels and strained glass. (4) In liquids due to streaming and in 'liquid' crystals. Pleochroism may be shown by fibres stained with dyes or metallic salts.

L. J. S.

[CHIRVINSKY (P. N.)] Чирвинский (П. Н.). Курс месторождений полезных ископаемых. [*Course on the occurrence of useful fossils* (i. e. economic minerals).] Новочеркасск [Novocherkassk] (Издание Студенческого Кооператива „Знание“), 1926, Part I, iii + 299 + vii pp., 31 pls.; Part II, iii + 354 + vi pp., 48 pls.

This book is a reproduction, by a 'glass-graphic' process, of a neatly written manuscript. It gives the substance of the author's lectures since 1910 in the Mining School of the Don Polytechnic at Novocherkassk. Part I deals with ores of the metals and Part II with non-metallic minerals. Useful minerals of all kinds are described and their applications mentioned. Their most important deposits in all parts of the world, with especial reference to those of Russia, are described from a genetic and partly geochemical point of view. Some statistics of production and of reserves are quoted, and their economic and political significance pointed out. References to the more important literature are cited.

P. N. C.

PRZIBRAM (Hans). *Die anorganischen Grenzgebiete der Biologie (insbesondere der Kristallvergleich)*. Sammlung Borntraeger Band 10, Berlin (Borntraeger), 1926, 240 pp., 65 figs. Price 7.50 Mk.

This book, the author of which is extraordinary-professor of experimental zoology in the University of Vienna, is a dissertation and review of the

literature dealing with the border-land between living and non-living matter. Analogies are drawn from the form and growth of crystals, including liquid crystals. A long bibliography is appended. L. J. S.

ROSENBUSCH (H.). *Mikroskopische Physiographie der Mineralien und Gesteine*. Band I, zweite Hälfte, spezieller Teil. *Die petrographisch wichtigen Mineralien*. 5th edit., by O. MÜGGE. Stuttgart (E. Schweizerbart), 1926, Lieferung 2, vi pp. + pp. 277-554, 11 pls., 98 text-figs. Price 27.50 Mk. [See Abstr., vol. 2, p. 413; vol. 3, p. 1.]

Contains a full account of the minerals of the orthorhombic and monoclinic systems, not including the monoclinic feldspars. The sections dealing with olivine, pyroxenes, and amphiboles give a summary of all the most recent observations on these important groups. Numerous analyses of the amphiboles are tabulated, but analyses of other minerals are not given. The plates of photomicrographs are excellent, and the numerous text-figures show crystal-form, etched-figures, and optical orientation. With the third part of this volume, which will contain, no doubt, the description of the monoclinic and triclinic feldspars and of the other triclinic minerals, Dr. Mügge will have completed a valuable work of reference on the microscopical characters of all minerals found in igneous, metamorphic, and sedimentary rocks. W. C. S.

TSCHERMAK (Gustav). *Lehrbuch der Mineralogie*. Neunte, unveränderte Auflage bearbeitet von Friedrich BECKE. Wien & Leipzig (Hölder-Pichler-Tempsky A. G.), 1923, xii + 752 pp., 2 col. pls., 977 text-figs. [Price 19s. 6d.]

This ninth edition is a reissue of the eighth edition [Abstr., vol. 1, p. 358] on poorer paper and at more than twice the price. L. J. S.

### Chemical Crystallography.

[BOLDYREV (A. K.)] Болдырев (А. К.). Принципы нового метода кристаллографического диагноза вещества.—BOLDIREV (A.). *Principes de la nouvelle méthode de diagnose cristallographique de la matière*. Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1924, ser. 2, vol. 53, pp. 251-342 (French résumé, pp. 337-342), 5 figs.

The identification of substances by means of their crystallographic constants is discussed, especially the method of crystallo-chemical analysis of E. S. Fedorov [Abstr., vol. 2, p. 100] which is based on structure and in which there is some difficulty in arriving at the correct complex-symbol. The new method suggested and worked out in some detail is based on

the interfacial angles taken in conjunction with other characters. Some 9000 substances have been entered on catalogue cards and sorted according to angles in each crystal-system. The cards give for each substance (1) a list of the common crystal-forms in the order of their importance, cleavage, twinning, &c.; (2) physical and optical data; (3) the more important crystal-angles. In the optically uniaxial systems the angles given are those to the basal plane, and in the remaining systems the angles to the axial planes with some others. This is explained in the French résumé, and sample cards are printed in German in the Russian text.<sup>1</sup>

P. N. C.

DOLIVO-DOBROVOLSKY (V. V.).—Доливо-Добровольский (В. В.). Вычисление чисел символа комплекса и их связь с элементами кристалла.—*Calculation des nombres de symbole de complet et leur relation aux constantes cristallographiques*. Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1924, ser. 2, vol. 53, pp. 79–101 (French résumé, p. 101), 7 figs.

Formulae are given for deriving the Fedorov complex-symbol from the  $\phi$  and  $\rho$  angles of two-circle measurements, thus introducing a simplification in the method.

P. N. C.

PORTER (Mary W.). *A contribution to the study of the optical properties of mixed crystals*. Proc. Roy. Soc. London, Ser. A, 1925, vol. 109, pp. 78–98, 16 figs. [Abridged translation:] PORTER (M. W.). *Ein Beitrag zum Studium der optischen Eigenschaften von Mischkristallen*. Zeits. Krist., 1926, vol. 63, pp. 557–567.

A series of mixed crystals  $(\text{NH}_4)_2\text{Mg}(\text{CrO}_4)_2 \cdot 6\text{H}_2\text{O} + \text{Rb}_2\text{Mg}(\text{CrO}_4)_2 \cdot 6\text{H}_2\text{O}$  show a gradual transition in the density, crystal-angles and axial ratios, and the refractive indices for sodium-light from one pure salt to the other. The refractive indices plotted against the percentage volumes gives a straight line for the index with vibrations along the axis of symmetry of the monoclinic crystals, whereas the other two lie on curves. At 95 vol. % of the ammonium salt  $\alpha$  and  $\beta$  become equal and the crystals are optically uniaxial. In this pair of salts the difference between the volume percentage and the molecular percentage is too slight to say whether this index is directly proportional to one or the other. When plotted against the weight percentage all three indices lie on curves.

<sup>1</sup> The data are taken from Groth's 'Chemische Krystallographie'. One of the examples given for the orthorhombic system is 'orthorhombic tin'. If the cards had sorted out perfectly it would have been noticed that this is the same as stannous sulphide as listed by Groth (compare Min. Mag., vol. 19, p. 114).—L. J. S.



Data are also given for mixed crystals of the pair ammonium-magnesium sulphate and chromate,  $(\text{NH}_4)_2\text{Mg}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O} + (\text{NH}_4)_2\text{Mg}(\text{CrO}_4)_2 \cdot 6\text{H}_2\text{O}$ . In this series the optic axial plane changes position three times, and crystals of three different compositions are optically uniaxial. These crystals showed optic anomalies and gave no decisive results. L. J. S.

TUTTON (A. E. H.). *The monoclinic double sulphates containing thallium. —Thallium nickel, and thallium cobalt sulphates.* Proc. Roy. Soc. London, Ser. A, 1925, vol. 108, pp. 240–261, 4 figs.

Detailed crystallographic and optical data are given for  $\text{Tl}_2\text{Ni}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$  ( $a:b:c = 0.7404:1:0.4997$ ,  $\beta = 73^\circ 37'$ ;  $D 3.770$ ;  $\beta_{\text{Na}} 1.6183$ ) and  $\text{Tl}_2\text{Co}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$  ( $a:b:c = 0.7413:1:0.4995$ ,  $\beta = 73^\circ 35'$ ;  $D 3.782$ ;  $\beta_{\text{Na}} 1.6176$ ). These salts belong to the large isomorphous series  $\text{R}_2\text{M}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$ , but they do not fall in the inner 'eutropic' series where  $\text{R} = \text{K}, \text{Rb}, \text{Cs}$ , since they do not show a regular progression in the physical constants with the atomic weight of the replacing R element. The refraction and dispersion are here much higher than for other members of the series. L. J. S.

TUTTON (A. E. H.). *The alkali perchlorates and a new principle concerning the measurement of space-lattice cells.* Proc. Roy. Soc. London, Ser. A, 1926, vol. 111, pp. 462–491, 9 figs.

Detailed crystallographic and optical data are given for the following perchlorates, which are orthorhombic and isomorphous with baryte.

	$a:b:c$ .	Mol. vol.	$a$ .	$b$ .	$c$ .
$\text{KClO}_4$ ...	1.5626:1:1.2807	54.91	8.85 Å.	5.67 Å.	7.26 Å.
$\text{RbClO}_4$ ...	1.5928:1:1.2884	61.33	9.28	5.83	7.51
$\text{CsClO}_4$ ...	1.6340:1:1.2970	70.05	9.84	6.03	7.81
$(\text{NH}_4)\text{ClO}_4$ ...	1.5862:1:1.2807	60.19	9.22	5.82	7.45

The double value is adopted for the  $a$ -axis as suggested by X-ray analysis, and the topic axial ratios ( $\chi:\psi:\omega$ ) are calculated, using the density determinations of T. V. Barker (1907–8). From the dimensions of the unit cell of baryte as deduced by X-ray analysis [Abstr., vol. 2, p. 509] it is possible to transform the relative topic axes into the absolute dimensions of the unit cells for the whole series. L. J. S.

STEINMETZ (H.). *Die chemisch-kristallographische Verwandtschaft.* Fortschr. Min. Krist. Petr., 1924, vol. 9, pp. 5–30.

— *Derzeitiger Stand der Kristallchemie und ihrer Probleme.* Zeits. Krist., 1925, vol. 61, pp. 337–338.

A general review of the subject of isomorphism, with remarks on isotypes, connexion between chemical formulae and crystal symmetry, chemical constitution and crystal structure, &c. The second note further

considers the condition of water in crystals, and of other substances in solid solution held in the interspaces of the crystal lattice. L. J. S.

CARSTENS (C. W.). *Zur Mineralogie des Monocalciumaluminats*  $\text{CaO} \cdot \text{Al}_2\text{O}_3$ . Zeits. Krist., 1926, vol. 63, pp. 473-477, 1 pl., 2 figs.

The  $\text{CaO} \cdot \text{Al}_2\text{O}_3$  derived from slag forms pseudo-hexagonal plates consisting of twinned interpenetrating triplets of orthorhombic crystals, whose cleavage, optical properties, &c., are very close to those of chrysoberyl. H. H.

ROGERS (Austin F.). *The crystallography of 2:1 sodium sulphate-carbonate*. Amer. Journ. Sci., 1926, ser. 5, vol. 11, pp. 473-476, 3 figs.

Small crystals of  $2\text{Na}_2\text{SO}_4 \cdot \text{Na}_2\text{CO}_3$  grew as a crust on a lump of  $\text{NaCl}$  that was suspended in a saturated solution of  $\text{Na}_2\text{SO}_4$  and  $\text{Na}_2\text{CO}_3$  at  $50^\circ\text{C}$ . They are orthorhombic,  $a:b:c = 0.579:1:1.213$ , with the forms  $p(111)$ ,  $m(110)$ ,  $d(101)$ , and are usually cyclic twins on  $d(101)$ . Optically positive,  $\alpha = a$ ,  $\gamma = b$ ,  $\beta = c$ ,  $\alpha 1.463$ ,  $\beta 1.469$ ,  $\gamma 1.480$ . This compound had recently been obtained by heating above  $25^\circ\text{C}$ . the brine of Searles Lake, California, and called 'burkeite', but it has not been found as a mineral. L. J. S.

KERR-LAWSON (D. E.). *The crystallography of potassium fluozirconate*. Univ. Toronto Studies, Geol. Ser., 1925, no. 20, pp. 63-67, 3 figs.

Crystals of this salt  $[\text{K}_2\text{ZrF}_6]$  were described by C. de Marignac (1860) as orthorhombic; they are now proved to be monoclinic with  $\beta = 89^\circ 40'$ , but usually twinned on (100) giving an orthorhombic habit. Crystals were grown on a coil of hairy string in a deep platinum crucible containing a boiling concentrated solution, which was allowed to cool slowly in a thermos flask. The axial ratios are  $a:b:c = 0.5731:1:0.5971$ , and the forms noted  $c(001)$ ,  $m(110)$ ,  $b(010)$ ,  $i(101)$ ,  $n(021)$ ,  $r(041)$ ,  $o(\bar{1}11)$ ,  $d(131)$ ,  $v(221)$ ,  $t(111)$ ,  $s(\bar{1}31)$ . The cleavage is (001), and there is polysynthetic twinning on (100) and less often on (001). The optic axial plane and the obtuse bisectrix ( $\alpha$ ) are normal to (010); extinction on (010) about  $45^\circ$  to the  $c$ -axis;  $\alpha 1.454$ ,  $\beta 1.465$ ,  $2V$  about  $60^\circ$ , positive. L. J. S.

ZAMBONINI (Ferruccio). *Sul molibdato normale di torio*  $\text{Th}(\text{MoO}_4)_2$ . Atti (Rend.) Accad. Lincei, Roma, Cl. Sci. fis. mat. nat., 1923, ser. 5, vol. 32, sem. 1, pp. 518-524, 2 figs.; Gazz. Chim. Ital., 1924, vol. 54, pp. 39-45, 2 figs.

ZAMBONINI (F.). *Sur le molybdate de thorium*  $\text{Th}(\text{MoO}_4)_2$ . Compt. Rend. Acad. Sci. Paris, 1923, vol. 176, pp. 1473-1475.

Minute (0.2 mm.) bipyramidal crystals of thorium molybdate  $\text{Th}(\text{MoO}_4)_2$

were obtained by fusing together thorium chloride and sodium molybdate. They are tetragonal with  $a:c = 1:0.73565$  and forms  $p(111)$ ,  $c(001)$ ,  $m(111)$ ; optically uniaxial and positive; sp. gr. 4.92. Taking  $a:2c = 1:1.4713$ , there is isomorphous agreement with the molybdates of Ca, Sr, Ba, Pb, and the rare-earths [also Bi; Abstr., vol. 2, pp. 244-5]. L. J. S.

BOEHM (G.). *Notiz über Mischkristalle zwischen Perchromaten und Pertantalaten (Perniobaten)*. Zeits. Krist., 1926, vol. 63, pp. 319-320.

Mixed crystals have been formed with the salts  $K_3CrO_8$  and  $K_3TaO_8$ ,  $Na_3CrO_8 \cdot 14H_2O$  and  $Na_3TaO_8 \cdot 14H_2O$ ,  $K_2CrO_8$  and  $K_3NbO_8$ . H. H.

GAUDEFREY (C.). *Propriétés cristallographiques et optiques du carbonate d'argent ammoniacal:  $CO_3Ag^2$ ,  $4NH^3$ ,  $H^2O$* . Bull. Soc. Franç. Min., 1923, vol. 46, pp. 20-34, 3 figs.

Crystals of this compound are orthorhombic,  $a:b:c = 0.577:1:0.768$ , exhibit the forms (110), (010), (001), (111), and (021), and possess two perfect cleavages parallel to (010) and (021). Pseudo-hexagonal twins possess combination-planes parallel to (001), (110) or (130). The optic axial plane is (010) and  $Bx_a = \gamma = [001]$ , with axial dispersion  $\rho < v$ . Sections showing the optic figure have a low birefringence and in the neighbourhood of  $\beta$  are achromatic when viewed in white light. Wedges cut to give the birefringence  $\gamma - a$  or  $\gamma - \beta$  will also show certain achromatic bands. These anomalies are due to the fact that  $\gamma - a$  increases with  $\lambda$  and that the function  $(\gamma - a)/\lambda$  has a maximum for  $\lambda = 480 \mu\mu$ .

E. D. M.

### Artificial Minerals.

[GINZBERG (A. S.) & NIKOGOSYAN (Khr. S.)] ГИНЗБЕРГ (А. С.) и НИКОГОСЯН (Хр. С.). Об искусственном рамзаите.—GINSBERG (A.) et NIKOGOSSIAN (Chr.). *Sur la ramsayite artificielle*. Изв. Геол. Ком. (Bull. Com. Géol. Leningrad), 1924, vol. 43, pp. 397-408 (Russ., with French résumé pp. 407-408).

A mixture of  $SiO_2$ ,  $TiO_2$ , and  $Na_2CO_3$  in the proportions given by the formula  $Na_2Si_2Ti_2O_9$  of ramsayite [Abstr., vol. 3, p. 111] was fused and slowly cooled. The resulting black, crystalline-granular, and very brittle mass has the appearance of natural ramsayite; it has  $D\ 3.47$ ,  $H\ 5\frac{1}{2}$ , and melting-point  $618-630^\circ$  (mean  $624^\circ C.$ ). Natural ramsayite melts at  $580^\circ$ , this lower value being due to the presence of other constituents, particularly  $FeO\ 1.03\ \%$ . Thin sections show blackish-brown needles with straight extinction, positive elongation, and cleavages



parallel to the length; the refraction and birefringence are high. A calcium-ramsayite ( $\text{CaSi}_2\text{Ti}_2\text{O}_9$ ) was also prepared. This has a much higher melting-point and the prismatic crystals are quite opaque in thin section. The system  $\text{Na}_2\text{Si}_2\text{Ti}_2\text{O}_9 - \text{CaSi}_2\text{Ti}_2\text{O}_9$  will be investigated.

P. N. C.

[LEBEDEV (P. I.)] Лебедев (П. И.). К вопросу о механизме кристаллизации в твердом состоянии. [*To the question of the mechanism of crystallization in the solid state.*] Известия Донского Государственного Университета, Ростов на Дону [Reports Don State University, Rostov on Don], 1925, vol. 5, pp. 15-24, 8 figs.

The microscopical characters of thin sections of melts of barium metasilicate ( $\text{BaSiO}_3$ ) and of  $\text{CaSiO}_3 + \text{CaS}$  are described. The observation of Voloskov (1911), that  $\text{BaSiO}_3$  is dimorphous, is confirmed. Orthorhombic crystals with a stronger refraction and birefringence develop in the crystals of the other modification of  $\text{BaSiO}_3$ , the amount formed being greater the slower the cooling; and it is considered that the transformation takes place in the solid material. By rapid crystallization at about  $1300^\circ\text{C}$ . skeletal crystals of the orthorhombic modification are formed, which by slow cooling give a regular intergrowth with the modification of low birefringence.

P. N. C.

EITEL (Wilhelm). *Die Synthese der Skapolithe auf Grund der Beobachtungen über ihre Vorkommnisse.* Tschermaks Min. Petr. Mitt., 1925, vol. 38, pp. 1-38, 2 pls., 5 text-figs.

Details of the complex system  $\text{Na}_2\text{CO}_3 - \text{CaCO}_3 - \text{Na}_2\text{Al}_2\text{Si}_2\text{O}_8$  (nepheline) —  $\text{CaAl}_2\text{Si}_2\text{O}_8$  (anorthite) with a bearing on the formation of scapolite minerals are collected from the author's previously published papers [Abstr., vol. 3, p. 3]. Meionite or a similar substance was obtained in fusions of anorthite with sodium and calcium carbonates, or of albite with calcium carbonate. Marialite has not been obtained artificially.

L. J. S.

HUME (John). *The hydrates of calcium carbonate.* Journ. Chem. Soc. London, 1925, pt. 1, vol. 127, pp. 1036-1039. [Compare Abstr., vol. 2, p. 217.]

Crystals of calcium carbonate hexahydrate,  $\text{CaCO}_3 \cdot 6\text{H}_2\text{O}$ , with  $D^{15}_{20}$  1.789, were obtained when a solution of lime in sucrose at  $0^\circ\text{C}$ . was allowed slowly to absorb carbon dioxide. The temperature-volume curve, shown in a dilatometer with the crystals in contact with the mother-liquor, shows breaks at  $11.3^\circ$ ,  $17.3^\circ$ , and  $25^\circ\text{C}$ . At  $11.3^\circ\text{C}$ . the material has the composition  $\text{CaCO}_3 \cdot 5\text{H}_2\text{O}$  and  $D^{15}_{20}$  1.835. Crystals of

the pentahydrate ( $D^{15}$  1.830 and 1.833) were also obtained from the sugar-lime solution at  $11.6^{\circ}\text{C}$ . A trihydrate is perhaps stable between  $17^{\circ}$  and  $25^{\circ}\text{C}$ ., but this could not be isolated. At  $25^{\circ}\text{C}$ . the crystals slowly change to the anhydrous carbonate ( $D$  2.6). L. J. S.

HEPBURN (Jack Reginald Irons). *The mechanism of the formation of malachite from basic cupric carbonate.* Journ. Chem. Soc. London, 1925, pt. 1, vol. 127, pp. 1007–1012, 1 pl.

The amorphous precipitate of basic cupric carbonate, obtained by mixing solutions of cupric sulphate and sodium carbonate, when allowed to stand at the ordinary temperature in the presence of carbon dioxide or  $\text{NaHCO}_3$  changes after a few days into malachite. In the presence of carbon dioxide minute individual crystals were formed, while with  $\text{NaHCO}_3$  spherulites were obtained. The spherulites have a diameter of  $6\mu$ , sp. gr. 3.64, and show a black cross between crossed nicols. Spherulites of malachite were also obtained from a hot ( $100^{\circ}\text{C}$ .) solution of precipitated cupric carbonate in  $\text{NaHCO}_3$ . L. J. S.

FOWLES (George). *A study of the basic copper sulphates.* Journ. Chem. Soc. London, 1926, pp. 1845–1858.

The basic salts obtained in a micro-crystalline form are (1)  $\text{CuSO}_4 \cdot 2\text{Cu}(\text{OH})_2$  (antlerite = stelznerite), (2)  $\text{CuSO}_4 \cdot 3\text{Cu}(\text{OH})_2$  (brochantite), (3)  $5\text{CuSO}_4 \cdot 9\text{Cu}(\text{OH})_2 \cdot 2\text{H}_2\text{O}$ , (4)  $2\text{CuSO}_4 \cdot \text{Cu}(\text{OH})_2 \cdot 4\text{H}_2\text{O}$ , and (5)  $2\text{CuSO}_4 \cdot 3\text{Cu}(\text{OH})_2$ . By boiling (hydrolysis) an unsaturated solution of copper sulphate (3) is obtained, which a prolonged boiling changes to (1). From a saturated solution (4) is deposited as rhombic tablets. The action of  $\text{Cu}(\text{OH})_2$  on  $\text{CuSO}_4$  solution yields mixtures of (1) and (2); with  $\text{CuO}$  in place of  $\text{Cu}(\text{OH})_2$  the salt (1) is obtained. L. J. S.

WEIL (R.). *Synthèse de la cristobalite par voie humide.* Compt. Rend. Acad. Sci. Paris, 1925, vol. 181, pp. 423–424.

Precipitated silica was heated for 200 hours at  $650$ – $750^{\circ}\text{C}$ . in water containing a little sodium silicate. A mixture of quartz and cristobalite resulted. No cristobalite is formed below  $650^{\circ}$ . The cristobalite has the form of minute ( $0.05$ – $0.1\text{mm}$ .) elongated cubo-octahedra with  $n$  1.487,  $D$  2.32. On cooling it changes, at about  $250^{\circ}$ , to the birefringent modification. L. J. S.

AMADORI (M.). *Ricerche sul gruppo della piromorfite.* Gazz. Chim. Ital., 1919, vol. 49, pt. 1, pp. 38–102, 2 tab.

A summary and discussion of previous papers. Several new analyses are given of pyromorphite from various localities, including analyses of

the interior and exterior portions of crystals from Wheal Alfred, Cornwall. Fluoro- and chloro-pyromorphites, mimetites, and vanadinites, and mixed crystals of these, were crystallized from fusion. The fluoro-compounds although obtained as hexagonal prisms 1 cm. long and 1 mm. thick did not yield terminated crystals. The following axial ratios ( $c$ ) were determined for the artificial chloro-compounds and mixed crystals: pyromorphite (0.73358), mimetite (0.72754), vanadinite (0.71115), 3 pyromorphite + 1 mimetite (0.73206), 1 pyromorphite + 3 mimetite (0.72990), 1 pyromorphite + 1 vanadinite (0.72326), 1 mimetite + 1 vanadinite (0.71984). These values are compared with numerous values determined on artificial crystals. L. J. S.

CAROBBI (G.). *Chlorovanadinite praseodimifera sintetica*. (*A proposito di un recente lavoro di W. Prandtl ed A. Grimm sulla ricerca dell'elemento n. 61*). Atti (Rend.) R. Accad. Lincei, Roma, Cl. Sci. fis. mat. nat., 1925, ser. 6, vol. 1, pp. 311-315.

CAROBBI (G.) & RESTAINO (S.). *Contributi allo studio delle piromorfiti, vanadiniti e mimetiti sintetiche, nelle quali il piombo è parzialmente sostituito da alcuni lantanidi*. Gazz. Chim. Ital., 1926, vol. 56, pp. 59-68, 2 figs.

Fusion of a mixture of lead vanadate, lead chloride, and praseodymium vanadate gave a crystalline praseodymiferous vanadinite containing 3.34 %  $\text{PrVO}_4$  in the formula  $3(\text{Pb, Pr})_3(\text{VO}_4)_2 \cdot \text{PbCl}_2$ . The fact that praseodymium here replaces lead and not vanadium does not support the arrangement of the rare-earths in the periodic system by Prandtl and Grimm (1924). The lanthanide metals can also enter isomorphously to a limited extent into this group. Mixed crystals were prepared of ceriferous pyromorphite containing 13.45 %  $\text{CePO}_4$ , lanthaniferous pyromorphite with 6.34 %  $\text{LaPO}_4$ , neodymiferous pyromorphite with 14.04 %  $\text{NdPO}_4$ , ceriferous vanadinite with 7.89 %  $\text{CeVO}_4$ , lanthaniferous vanadinite with 8.39 %  $\text{LaVO}_4$ , and ceriferous mimetite with 17.92 %  $\text{CeAsO}_4$ . L. J. S.

FOOTE (H. W.). *The system sodium nitrate-sodium sulphate-water, and the minerals darapskite and nitroglaukerite*. Amer. Journ. Sci., 1925, ser. 5, vol. 9, pp. 441-447, 1 fig.

Solubility data were determined for mixtures in various proportions of sodium nitrate and sodium sulphate at temperatures  $0^\circ$ ,  $25^\circ$ , and  $35^\circ$  C. The only double salt is  $\text{NaNO}_3 \cdot \text{Na}_2\text{SO}_4 \cdot \text{H}_2\text{O}$ , corresponding with darapskite, which is formed above  $13.5^\circ$  C. No evidence was obtained of the existence of  $6\text{NaNO}_3 \cdot 2\text{Na}_2\text{SO}_4 \cdot 3\text{H}_2\text{O}$ , corresponding



with nitroglauberite, and it is suggested that this mineral is a mixture of darapskite and sodium nitrate.

L. J. S.

BELLINZONA (Giuseppina). *Di una interessante scoria fayalitica cristallizzata*. Atti (Rend.) R. accad. Lincei, Cl. Sci. fis. mat. nat., Roma, 1923, ser. 5, vol. 32, sem. 2, pp. 237-243, 2 figs.

Rhombic crystals, (010), (110), (021), of fayalite (sp. gr. 3.91) from a slag of unknown origin gave analysis corresponding approximately with the formula  $\text{Fe}_3\text{Si}_2\text{O}_7$ . The excess of silica is presumably present in eutectic form as tridymite or cristobalite, or possibly as  $\text{FeSiO}_3$ .

L. J. S.

MOREY (G. W.) & BOWEN (N. L.). *The binary system sodium metasilicate-silica*. Journ. Physical Chem., 1924, vol. 28, pp. 1167-1179, 2 figs.

Liquidus curves were determined by the quenching method.  $\text{Na}_2\text{SiO}_3$  melts at  $1088^\circ\text{C}$ . The only other compound is  $\text{Na}_2\text{O} \cdot 2\text{SiO}_2$  (m.p.  $874^\circ\text{C}$ .) which has a very blunt melting curve, forming eutectics with  $\text{Na}_2\text{SiO}_3$  at  $840^\circ\text{C}$ . and with high-temperature quartz at  $793^\circ\text{C}$ ., from which point the quartz-tridymite-cristobalite curve rises very steeply to  $1710^\circ\text{C}$ . The curves are compared with those for the potash and lithia compounds, and attention is directed to the bearing of these low eutectic temperatures upon the behaviour of rock melts and of glasses. Both compounds,  $\text{Na}_2\text{SiO}_3$  and  $\text{Na}_2\text{Si}_2\text{O}_5$ , are apparently orthorhombic; optical data are given.

A. F. H.

MOREY (G. W.) & BOWEN (N. L.). *The ternary system sodium metasilicate-calcium metasilicate-silica*. Title on wrapper reads: *The melting relations of the soda-lime-silica glasses*. Trans. Soc. Glass Technology, Sheffield, 1925, vol. 9, pp. 226-264, 9 figs.

The equilibrium-diagram is determined by quenching small quantities of melt held at constant temperature; because of volatilization the melts were analysed after preparation. The compositions dealt with lie between  $\text{Na}_2\text{O} \cdot \text{SiO}_2$ ,  $\text{CaO} \cdot \text{SiO}_2$ , and  $\text{SiO}_2$ . Seven compounds occur, including silica (three forms—quartz, tridymite, and cristobalite),  $\text{CaO} \cdot \text{SiO}_2$  (two forms—wollastonite and pseudo-wollastonite),  $\text{Na}_2\text{O} \cdot \text{SiO}_2$  and  $\text{Na}_2\text{O} \cdot 2\text{SiO}_2$  (preceding abstract); three new compounds are  $2\text{Na}_2\text{O} \cdot \text{CaO} \cdot 3\text{SiO}_2$ ,  $\text{Na}_2\text{O} \cdot 2\text{CaO} \cdot 3\text{SiO}_2$ , and  $\text{Na}_2\text{O} \cdot 3\text{CaO} \cdot 6\text{SiO}_2$ . The last-named is commonly found in devitrified commercial glasses. Along the margin  $\text{CaO}-\text{SiO}_2$  the region of immiscible liquid phases announced by J. W. Greig is indicated. Commercial glasses lie in the region  $\text{Na}_2\text{O} \cdot 2\text{SiO}_2-$

$\text{Na}_2\text{O} \cdot 3\text{CaO} \cdot 6\text{SiO}_2\text{--SiO}_2$  in which lies the ternary eutectic melting at  $725^\circ\text{C}$ . Near this low temperature the melts are very viscous and do not easily crystallize; the range of commercial glasses is extended by the presence of alumina, &c., which further lower the stability surfaces. The blunt form of the stability surfaces indicates considerable dissociation in the liquid phase and 'no correlation is evident between the melting-point diagram and either the refractive index or the dispersion diagram'. The same is shown to be true of the viscosity of the melts, for which diagrams are reproduced.

A. F. H.

GIBSON (Ralph Edward), WYCKOFF (Ralph W. G.), & MERWIN (Herbert E.). *Vaterite and  $\mu$ -calcium carbonate*. Amer. Journ. Sci. 1925, ser. 5, vol. 10, pp. 325-333, 2 figs.

X-ray powder photographs show that 'vaterite' includes two forms, which are termed A and B. Vaterite A, prepared by the method of Johnson, Merwin, and Williamson [Abstr., vol. 1, p. 166], is spherulitic calcite; vaterite B, by crystallization of colloidal calcium carbonate at  $5^\circ\text{C}$ . in the presence of a large excess of potassium carbonate, has indices  $\epsilon$  1.640-1.645,  $\omega$  1.550 and is spherulitic  $\mu\text{-CaCO}_3$ , with positive elongation of the fibres.

A. F. H.

### Growth and Corrosion of Crystals.

GAUBERT (P.). *Sur la modification du faciès des cristaux par suite de leur syncrystallisation avec une matière étrangère dissoute dans l'eau mère*. Compt. Rend. Acad. Sci. Paris, 1925, vol. 180, pp. 378-380.

GAUBERT (Paul). *Les modifications du faciès des cristaux*. Rev. Gén. Sci., Paris, 1926, vol. 37, pp. 357-366.

The habit of crystals may be modified when they take up foreign substances from the solution in which they grow. Lead nitrate crystallizes from pure water as octahedra, but in a saturated solution of methylene-blue it crystallizes as cubes. When octahedra are placed in such a solution there is an accumulation of methylene-blue on the apices of the crystals and growth of the lead nitrate in this direction is hindered. An analogy is considered in the modification of the habit of crystals of ammonium and potassium iodide growing on a cleavage of mica; here octahedral faces are developed.

L. J. S.

RINNE (Friedrich). *Zur Sammelkristallisation natürlicher Salze*. Zeits. Krist., 1925, vol. 62, pp. 150-151.

In Zeits. Krist., 1925, vol. 61, p. 389, the author had described experiments in which powdered rock-salt and sylvine slowly recrystal-

lized on being subjected to temperatures of 300° C. and upwards, the fact of crystallization being established by the usual X-ray methods. He has now verified the fact that the crystallization can take place at much lower temperatures, provided sufficient time is allowed. H. H.

MÜGGE (O.). *Über gehemmtes Kristallwachstum*. Zeits. Krist., 1925, vol. 62, pp. 415-442, 16 figs.

In many rocks minerals are seen to assume forms which are spherical or rounded polyhedra, while absence of etching makes it improbable that the absence of the typical plane-faced crystalline shape is due to resolution by the surrounding matrix. Suggestions are put forward in explanation of this and similar phenomena. H. H.

KYROPOULOS (S.). *Ein Verfahren zur Herstellung großer Kristalle*. Zeits. Anorg. Chem., 1926, vol. 154, pp. 308-313, 2 figs.

Alkali halides (NaCl, NaBr, KCl, KBr, KI, RbCl, LiF) are fused and kept at a constant temperature in a platinum crucible enclosed in an electric furnace, and an air-cooled platinum tube dips slightly below the surface of the melt. A single crystal grows out from the cooler and fills the crucible. L. J. S.

HEDGES (Ernest Sydney) & MYERS (James Eckersley). *The periodic crystallisation of pure substances*. Journ. Chem. Soc. London, 1925, vol. 127, pt. 2, pp. 2432-2434, 1 pl.

The crystallization of films of saturated solutions of chrome-alum and barium nitrate was observed under the microscope. With chrome-alum, alternate zones contain many small spherulites and few large spherulites. These spherulites represent the metastable form, and it is possible that this has some connexion with the rhythmic precipitation. Benzoic acid crystallized from a mixture of sulphuric acid and ethyl alcohol gave concentric spherical shells, 1 cm. apart, consisting of closely packed crystals and separated by spaces containing mostly solution. L. J. S.

HEDGES (Ernest Sydney). *Experiments on the variation of the angles of crystals during growth*. Journ. Chem. Soc. London, 1926, pp. 791-799, 2 figs.

A continuation of the work of H. A. Miers (1903) on the growth of vicinal faces. Using the same goniometer, measurements were made at frequent intervals during the growth of crystals of sodium potassium tartrate, magnesium sulphate, diammonium hydrogen phosphate, and sodium chloride. The number of vicinal faces undergoes an initial

increase, followed by a decrease. The images from faces undergo continual and rapid variations in position—5' or 10' of arc may be traversed in a second of time—and they may be as much as 2° from the true position. On sodium chlorate the distribution of the vicinal faces is consistent with the low degree of symmetry of the crystal. The slower the growth of the crystal, the more closely does it approximate to the ideal form.

L. J. S.

FELLS (H. A.) & FIRTH (J. B.). *Change of crystal structure of some salts when crystallised from silicic acid gel—The structure of silicic acid gel.* Proc. Roy. Soc. London, Ser. A. 1926, vol. 112, pp. 468–474, 2 pls., 1 text-fig.

Gels precipitated from sodium silicate solution by acid (HCl, &c.) were dried without washing out the sodium salt (NaCl, NaNO<sub>3</sub>, NaBr, NaI). The drying gel became covered with an efflorescence of fine fibres, the usual habit of the crystals being changed. The fibrous crystals of NaCl are elongated along a cubic axis and they show elongated cavities containing liquid and bubble. Crystallization evidently took place where pores reached the surface; suggesting that the gel has a capillary structure.

L. J. S.

BAIN (George W.). *Skeleton quartz crystals.* Amer. Min., 1925, vol. 10, pp. 435–441, 7 figs.

Quartz phenocrysts in rhyolite vitrophyre from Agate Point, on the north shore of Lake Superior [Ontario], show skeletal growths, consisting of three plates intersecting at 60° in the vertical axis and with cross bars [resembling twinned crystals of cerussite]. These were afterwards partly resorbed by the magma, showing irregular rounded outlines.

L. J. S.

GOLDSCHMIDT (V.). *Über Kontaktflächen, Kontaktzonen, Kontaktlinien.* Beitr. Kryst. Min., 1924, vol. 2, pp. 176–177, 2 figs.

A discussion of the surfaces of contact of crystals that have grown together, e. g. interpenetrating twins of fluorite, 'babel-quartz', &c.

L. J. S.

GOLDSCHMIDT (V.). *Über Wachstums-Gebilde.* Beitr. Kryst. Min., 1924, vol. 2, pp. 167–175, 12 figs.

A discussion of the forms of growth shown on the surfaces of crystals as evidenced by striations, steps, terraces, &c.

L. J. S.



GOLDSCHMIDT (V.) & PORTER (Mary W.). *Aquatorial* [i.e. *Äquatorial*] *-Grat und -Rinne am selben Calcit-Lösungskörper*. Beitr. Kryst. Min., 1924, vol. 2, pp. 138-140, 2 figs.

On a sphere of calcite etched with dilute hydrochloric acid the equatorial separation between the upper and lower curved surfaces is marked by a ridge part of the way and by a furrow for the remainder.

L. J. S.

BAUHANS (H.) [1888-1918] & GOLDSCHMIDT (V.). *Über vectorielle Lösungsgeschwindigkeit bei Flußspat*. Beitr. Kryst. Min., 1924, vol. 2, pp. 123-137, 1 pl., 6 text-figs.

A further series of measurements of the rate of solution along certain directions of spheres of fluorite in 5-40 % nitric acid at 50° C. [Abstr., vol. 1, p. 306]. In the initial stages the rate of solution is greatest normal to the faces of the rhombic-dodecahedron, next on the octahedron, and least on the cube. In the final solution-form these rates are reversed.

L. J. S.

TAMMANN (G.). *Die Auflösungs geschwindigkeit und die Ätzfiguren von Kristallen*. Zeits. Anorg. Chem., 1925, vol. 146, pp. 413-419, 3 figs.

TAMMANN (G.) & KRINGS (W.). *Über die Lage der Ätzfiguren und die Verteilung der Atome im Raumgitter*. Ibid., pp. 420-432, 21 figs.

The mechanics of the process of solution in the production of etch-figures on crystal faces is considered. From the known structures of galena, halite, fluorite, blende, pyrite, and calcite, theoretical etch-figures are deduced. [Cf. Min. Mag., vol. 20, p. 420.]

L. J. S.

RINNE (Friedrich) & KULASZEWSKI (Lotte). *Natürliche und künstliche Lösungskörper von Granat*. Tschermaks Min. Petr. Mitt., 1925, vol. 38, pp. 376-381, 2 pls.

Spheres of almandine etched with boiling hydrofluoric acid gave the cubo-octahedron as the solution form. In fused caustic potash the final form is a cube with rounded faces. Stereographic projections of the light-figures from each of these forms indicate holohedral cubic symmetry. Some small crystals of almandine from Minas Geraes, Brazil, have the form of rounded cubes, and are evidently solution forms. In contrast with this, the common growth forms of garnet are the rhombic-dodecahedron and the icositetrahedron.

L. J. S.

GROß (R.) & MÖLLER (H.). *Sind die Wachstumserscheinungen aus den Lösungserscheinungen durch Umkehrung des Vorzeichens abzuleiten?* Neues Jahrb. Min., Abt. A, 1925, Beilage-Band 53, pp. 95-133, 1 pl., 9 text-figs.

A mathematical discussion of the difference between the forms produced by growth and solution of crystals. Experiments and measurements were made of the growth from solution on polished spheres of halite and sylvine. Parallel growths with numerous projecting corners and re-entrant angles were obtained. During growth, areas with a minimum growth velocity (i.e. the faces of the final form) remain smooth, whilst during solution such areas become roughened. A formula is given for the concentration curve of a saturated solution with falling temperature and formation of crystal nuclei.

L. J. S.

### Instruments and Apparatus.

RÖSCH (Siegfried). *Goniometrie auf photographischem Wege.* Ber. Verh. Sächs. Akad. Wiss. Leipzig, Math.-Physis. Kl., 1925, vol. 77, pp. 89-98, 1 pl., 7 text-figs.

—— *Ein photographisches Goniometer.* Beitr. Kryst. Min., 1926, vol. 3, pp. 105-112, 3 pls., 8 text-figs.

A crystal is mounted on an adjustable holder at a short distance from a photographic plate and is illuminated, either through a small hole in the middle of the plate, or by means of a beam of light originally parallel to the plate and reflected on to the crystal from a small mirror just in front of the centre of the plate and inclined to it at an angle of  $45^\circ$ . The reflections from all faces of the crystal inclined to the plate at angles not exceeding  $45^\circ$  are thus photographed simultaneously, and their positions measured subsequently on the plate. This method of crystal measurement is especially useful for crystals with a large number of very small faces, for crystals with curved or etched faces (direct photographs being so obtained of the 'light-figures'), and for crystals growing in a solution which should not be disturbed.

H. H.

BÄR (Adolf). *Neue Anlegegoniometer zur Messung, Berechnung und Zeichnung der Kristalle.* Zeits. Krist., 1925, vol. 62, pp. 274-311, 369-394, 49 figs.

Various contact-goniometers are described with an extensive bibliography. In the first type of new instrument, one face of the crystal is horizontal. The vertical and horizontal co-ordinates of two points on a line of greatest slope of a second face are obtained by bringing into

contact with them the end of a horizontal bar which can be moved up and down through measured distances. In another type, the angle between two faces is made to coincide with the angle between a fixed and a movable bar, this angle being read on a divided circle. Other patterns of goniometer consist of a vertical rectangular plate, one edge of which is laid on a crystal-face, and the inclination to the horizon of the face is obtained by means of a plumb-line or spirit-level attached to the plate. In another kind the plane of each face is brought in turn into the plane of two parallel threads serving as sights. In the last type described use is made of the fact that the prolongation of an edge or face of the crystal coincides with its reflection in a mirror, when it is perpendicular to the plane of that mirror.

H. H.

HERRMANN (Karl). *Kristallorientierungsapparat für Röntgenogramme*. Zeits. Krist., 1925, vol. 62, pp. 218-222, 1 fig.

The ordinary theodolite-goniometer is not suited to the orientation of a crystal for the purpose of X-ray photographs, because the adjusting apparatus is too cumbrous and gets in the way of the radiation. A more convenient and compact method is described of holding and adjusting the crystal on the usual pattern of two-circle goniometer when Röntgenograms are required.

H. H.

WYCKOFF (Ralph W. G.) & KSANDA (C. J.). *A simple model for illustrating the atomic arrangements in crystals*. Amer. Journ. Sci., 1926, ser. 5, vol. 11, pp. 377-380, 3 figs.

A model to illustrate crystal-structure is made by supporting parallel glass plates on nuts moving on four long vertical screws. Each plate gives an atomic plane, and the atoms are represented by paper discs attached to the plates, white above but blackened underneath to avoid reflection from the lower plates.

H. H.

[VULF (G. V.) = WULFF (G.)] ВУЛЬФ (Г. В.) [1863-1925]. Параллелограмметр или простой прибор для определения ретикулярных плотностей сеток пространственной решетки.—WULFF (G.). *Parallélogramme-mètre ou un simple appareil pour la détermination de la densité réticulaire de plans en réseau d'espace*. Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1924, ser. 2, vol. 53, pp. 1-6 (French résumé, p. 6), 3 figs.

A simple apparatus for measuring the areas of parallelograms. The reticular density is inversely proportional to the areas. It consists of a scale rotating about the centre of a protractor, and a second scale

rotating about a centre that can be moved across squared paper. The instrument can also be used for solving plane triangles. P. N. C.

[BOLDYREV (A. K.)] Болдырев (А. К.). Угловой циркуль, стереографический транспортир и простейшая стереографическая сетка.—BOLDYREV (A.). *Le compas d'angle, le rapporteur stéréographique et le canevas stéréographique le plus simple.* Зап. Росс. Общ. (Mém. Soc. Russe Min.), 1923, ser. 2, vol. 51, pp. 458–465, 2 pls., 3 text-figs.

A simple form of three-point compass consisting of three bars hinged in one plane, for use with the stereographic projection. P. N. C.

[RAZUMOVSKY (N. K.)] Разумовский (Н. К.). Простейшие конструкции некоторых чертежных приборов для стереографических проекций.—RAZUMOVSKY (N.). *Les plus simples constructions de quelques instruments de plan pour les projections stéréographiques.* Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1923, ser. 2, vol. 51, pp. 455–457, 3 figs.

Simple forms of apparatus for drawing stereographic projections are figured and described. (1) A ruler for drawing flat curves. (2) A protractor consisting of two rulers hinged together. (3) A stereographic ruler with scale and net. P. N. C.

HILL (Edwin A.). *Crystal angles, measured under the microscope.* Journ. Amer. Chem. Soc., 1926, vol. 48, pp. 651–654, 1 fig.

The angle of slope of faces in a zone on a microscopic crystal may be deduced by measuring the horizontal co-ordinate between the parallel edges by means of a micrometer scale and the vertical co-ordinate by focusing with a fine adjustment. L. J. S.

EITEL (Wilhelm). *Die experimentellen Hilfsmittel zur Mineralsynthese unter hohen Drucken und hohen Temperaturen.* Fortschr. Min. Krist. Petr., 1925, vol. 10, pp. 157–186, 23 figs.

A detailed and well-illustrated review is given of the various types of apparatus that have been used for experiments under high pressure and temperature; with special reference to those adapted for mineral synthesis in an atmosphere of gas such as carbon dioxide. The earliest form is that of J. Hall (1812), and the latest those of H. E. Boeke, as modified by the author, and of the Geophysical Laboratory at Washington.

L. J. S.

ROBERTS (H. S.) & STADNICHENKO (Taisia). *A micro-furnace for high magnification.* Journ. Opt. Soc. Amer., 1925, vol. 10, pp. 605–608, 2 figs.

A resistance furnace of the cylindrical type was found to be unsuitable for use with high magnification (16 mm. objective). The object is placed



between two slips of silica-glass around which is bent a nichrome ribbon (with holes opposite the object) to act as the electric heater. The small enclosing case, with mica filling and thin windows of silica-glass, is provided with a thermocouple, water cooler, and arrangements for a constant flow of helium to prevent oxidation of the object. L. J. S.

WENTWORTH (Chester K.). *An improved recording micrometer for rock analysis.* Journ. Geol. Chicago, 1923, vol. 31, pp. 228-232, 2 figs.

HUNT (Walter F.). *An improved Wentworth recording micrometer.* Amer. Min., 1924, vol. 9, pp. 190-193, 2 figs.

A modification of the S. J. Shand (1916) recording micrometer for use in the Rosiwal method of micrometric analysis with thin sections of rocks. On the screw are five recording dials, so that five different minerals can be separately recorded in the same traverse. Further improvements in detail are suggested in the second paper. L. J. S.

HUGILL (W.) & REES (W. J.). *A rapid method for the determination of true (or powder) specific gravity.* Trans. Ceramic Soc. Stoke-on-Trent, 1925, vol. 24 (for 1924-25), pp. 70-72, 1 fig.

For determining the specific gravity of a large number of samples of such materials as powdered silica-bricks, cements, &c., a flask is filled with liquid (preferably xylene) to the 250 c.c. mark, and 100 gm. of the powder introduced. The sp. gr. is then read directly on the graduations on the long neck of the flask, with accuracy to the second place of decimals. L. J. S.

KRAUS (Edward H.). *A calculating Jolly balance.* Amer. Min., 1926, vol. 11, pp. 169-172, 5 figs.

A Jolly spring balance is provided with a pointer and scale on which the specific gravity can be read directly. L. J. S.

### X-rays and Crystal-structure.

WYCKOFF (R. W. G.). *X-ray diffraction data from crystals and liquids.* Reprinted from Internat. Critical Tables, 1926, vol. 1, pp. 338-353, 413-415, 11 figs.

This is a tabulation of all available data relating to crystal-structures, arranged under the headings of elements, compounds, alloys, liquids, and solid solutions. For each substance is given the chemical symbol, crystal system, structure type, space-group, number of molecules in and size of the unit cell, the calculated density, and references to the literature.

H. H.

[BOLDYREV (A. K.)] Болдырев (А. К.). Переход от рентгенограмм кристаллов к циклическим диаграммам W. L. Bragg'a.—BOLDIREV (A.). *Transformation des röntgenogrammes des cristaux en les diagrammes cycliques de W. L. Bragg.* Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1925, ser. 2, vol. 52, pp. 182–187, 2 figs.

A mathematical expression is given of Bragg's (1913) statement: 'The refracted beam always lies on a circular cone with apex at the crystal section, the zone axis as axis, and the direction of the primary beams as one generator.' P. N. C.

LEONHARDT (J.). *Über den Einfluß von Divergenz und Konvergenz des Primärstrahls auf Form und Größe der Beugungsflecken im Lauephotogramm.* Zeits. Krist., 1926, vol. 63, pp. 475–495, 16 figs.

The shape of the Laue diffraction-spots in Laue diagrams is investigated experimentally and theoretically. The X-rays strike the crystal face in a region which may be practically a point or a comparatively large circular area, or be on the other hand a rectangular strip, fairly large or of negligible width. Again, the incident rays may be converging or diverging. Six different cases are considered, with special reference to questions of deformation, re-crystallization, &c. H. H.

NIGGLI (Paul). *Baugesetze kristalliner Materie.* Zeits. Krist., 1926, vol. 63, pp. 49–121, 61 figs.

Diagrams are given, each containing some ten to thirty pictures of varying habits of a well-known mineral, such as pyrite, magnetite, spinel, blende, garnet, fluorite, chalcocite, beryl, aragonite, &c., to illustrate the relation of habit to the constituents into which the structure as revealed by X-ray analysis may be supposed to be split up. H. H.

SCHIEBOLD (E.) & SACHS (G.). *Graphische Bestimmung der Gitterorientierung von Kristallen mit Hilfe des Laueverfahrens. Gesetzmäßiges Wachstum von Aluminiumkristallen bei der Rekristallisation.* Zeits. Krist., 1926, vol. 63, pp. 34–48, 15 figs.

The authors consider the problem of determining the orientation of a crystal of known structure from a Laue diagram whose direction relative to the crystal is not given. They apply their methods to the case of re-crystallized rods of aluminium. H. H.

EHRENBERG (W.). *Die Größe des Diamantgitters.* Zeits. Krist., 1926, vol. 63, pp. 320–321.

A very careful determination gave the lattice constant of diamond at 18° C. as  $3.5597 \pm 0.001$  Å., and the density 3.511. H. H.

DAVEY (Wheeler P.). *Precision measurements of the lattice constants of twelve common metals*. Physical Rev., 1925, ser. 2, vol. 25, pp. 753-761. [Abridged translation:] *Präzisionsmessungen der Gitterkonstanten verbreiteter Metalle*. Zeits. Krist., 1926, vol. 63, pp. 316-317.

Tables are given of the structure constants of the metals Al, Ni, Cu, Pt, Au, Pd, Ag, Pb, Fe, Mo, W, Bi, determined with a high degree of accuracy. H. H.

BARTH (Tom.) & LUNDE (Gulbrand). *X-ray investigations on the platinum metals, silver, and gold*. Norsk Geol. Tidsskrift, 1926, vol. 8 (for 1924-5), pp. 258-269, 7 figs.

—— ——— *Die Gitterkonstanten der Platinmetalle, Silber und Gold. Bemerkungen über die Lanthanidenkontraktion*. Zeits. Physik. Chem., 1926, vol. 121, pp. 78-102, 7 figs.

New determinations, in addition to those previously given [Abstr., vol. 3, p. 17], were obtained by the powder method, the materials being mixed with halite for direct comparison: for Ag  $a = 4.078 \text{ \AA}$ . (face-centred cubic), Au  $4.070$ ; and for Ru  $a = 2.695$ ,  $c = 4.273$ ,  $c/a = 1.586$  (close-packed hexagonal), Os  $a = 2.744$ ,  $c = 4.314$ ,  $c/a = 1.584$ . Owing to the 'lanthanide contraction' [Abstr., vol. 3, p. 17], the spacing of osmium is only slightly greater than that of ruthenium, while for Ag-Au there is over-compensation. Calculations from the thermal expansion and compressibility data show that the spacings of Pd and Pt approach near the melting-point; and that at lower temperatures and higher pressures the spacing of silver is less than that of gold. The shortest atomic distances and the atomic volumes are calculated from the lattice constants for the horizontal rows Cr-Cu, Mo-Ag, W-Au on either side of the 'lanthanides' in the periodic table; and the relations of the pair Zr-Hf are also discussed. L. J. S.

TERPSTRA (P.). *Zur Kristallstruktur des Thalliums*. Zeits. Krist., 1926, vol. 63, pp. 318-319.

Attention is called to the fact that the Debye-Scherrer photographs of thallium, which were interpreted by G. R. Levi [Abstr., vol. 2, p. 513] as implying a hexagonal structure, are also consistent with a tetragonal arrangement similar to that of gallium. H. H.

OTT (H.). *Das Gitter des Karborunds (SiC). III*. Zeits. Krist., 1926, vol. 63, pp. 1-18, 9 figs. [Cf. Abstr., vol. 2, p. 18.]

The structure of the rarely occurring third modification of carborundum (SiC) was found by Laue diagrams to be hexagonal. The fundamental

cell contains four molecules. The carbon atoms have the co-ordinates  $(0\ 0\ 0)$ ,  $(0\ 0\ \frac{1}{2})$ ,  $(\frac{1}{3} - \frac{1}{3}\ \frac{1}{4})$ ,  $(-\frac{1}{3}\ \frac{1}{3}\ \frac{3}{4})$ , while the co-ordinates of the silicon atom are got by increasing the third of these by  $\frac{3}{16}$ . The dimensions of the cell are given by  $a=3.09$ ,  $c=10.09\ \text{\AA}$ . The amorphous modification of carborundum was tested by the Debye method and found to consist of irregularly placed crystals of the blende type mixed with a small percentage of modification II. H. H.

ZACHARIASEN (William). *Die Kristallstruktur der Telluride von Zink, Cadmium und Quecksilber*. Norsk Geol. Tidsskrift, 1926, vol. 8 (for 1924-5), pp. 302-306.

These tellurides were prepared by heating together the elements, and were examined by the X-ray powder method. They are cubic with the blende type of structure. The dimensions of the unit cubes containing four molecules are: for ZnTe 6.07, CdTe 6.444, HgTe 6.36  $\text{\AA}$ .; and the densities calculated from the X-ray data are 5.72, 6.06, and 8.42 respectively. L. J. S.

HARTWIG (Wilhelm). *Die Kristallstruktur einiger Mineralien der regulären HgS-Reihe*. Sitzungsber. Preuss. Akad. Wiss. Berlin, 1926, pp. 79-80.

The Debye-Scherrer method showed that the minerals metacinnabarite, guadalcazarite, onofrite, tiemannite, and coloradoite belong to the blende type, and that the length of the edge of the unit cell in Ångström units is respectively 5.822, 5.781, 5.906, 6.069, 6.444; the calculated densities are respectively 7.722, 7.396, 7.920, 8.199, 8.025. H. H.

JONG (W. F. de). *Die Struktur des Tiemannit und Koloradoit*. Zeits. Krist., 1926, vol. 63, pp. 466-472, 2 figs.

Tiemannite (HgSe) and coloradoite (HgTe) were investigated by the powder X-ray method and found to possess a blende structure, the edges of the unit cell being respectively 6.04 and 6.43  $\text{\AA}$ ., and calculated densities 8.41 and 8.20. H. H.

JONG (W. F. de). *De structuur van sperryliet*. Physica, 1925, vol. 5, pp. 292-301, 4 figs. (Dutch, with German summary p. 301).

The structures possible for sperrylite are discussed. Only on the assumption that the Pt and As atoms are structurally equivalent can the structure be that of the pyrite type  $T_h^6$ . The unit cell containing



four molecules  $\text{PtAs}_2$  has edge  $a = 5.92 \text{ \AA.}$  with parameter  $u = 0.38$ ;  $d_{\text{Pt-As}} = 2.47$ ,  $d_{\text{As-As}} = 2.46 \text{ \AA.}$  The calculated density is 10.87.

L. J. S.

OTT (H.). *Die Strukturen von MnO, MnS, AgF, NiS, SnJ<sub>4</sub>, SrCl<sub>2</sub>, BaF<sub>2</sub>; Präzisionsmessungen einiger Alkalihalogenide.* Zeits. Krist., 1926, vol. 63, pp. 222-230.

The following X-ray structures are given. Manganosite ( $\text{MnO}$ ) by powder method, halite structure, length  $a$  of elementary cube is  $4.47 \text{ \AA.}$  Alabandine ( $\text{MnS}$ ), by powder method, halite structure, with  $a = 5.24 \text{ \AA.}$   $\text{AgF}$ , by powder method, halite structure, with  $a = 4.92 \text{ \AA.}$  Millerite ( $\text{NiS}$ ), by spectrometer method, a hexagonal cell, whose  $a$  and  $c$  axes have lengths  $9.61$  and  $3.15 \text{ \AA.}$ , containing nine molecules, or a rhombohedral cell containing three.  $\text{SnI}_4$ , by powder method, a cubic cell containing one molecule with  $a = 6.12 \text{ \AA.}$  This agrees with the results of H. Mark and K. Weissenberg [Abstr., vol. 2, p. 200]; of the two alternative methods of placing the atoms given by them the first is preferred.  $\text{SrCl}_2$ , by powder method, fluorite type, with  $a = 6.965 \text{ \AA.}$   $\text{BaF}_2$ , by powder method, cubic, probably not fluorite type. Exact measurements of some cubic crystals gave by comparison with halite ( $a = 5.6280$ ) for the length of the edge of the elementary cell the values:  $\text{NaBr } 5.962$ ,  $\text{KCl } 6.277$ ,  $\text{KBr } 6.586$ ,  $\text{RbCl } 6.535$ ,  $\text{RbBr } 6.854$ ,  $\text{LiF } 4.019 \text{ \AA.}$

H. H.

WYCKOFF (Ralph W. G.) & POSNJAK (Eugen W.). *A note on the crystal structures of lithium iodide and rubidium fluoride.* Journ. Washington Acad. Sci., 1923, vol. 13, pp. 393-397.

The data given for  $\text{LiI}$  and  $\text{RbF}$  are not consistent [Abstr., vol. 2, pp. 18-19, 197], and these salts being very deliquescent it is probable that the determinations were in part made on the hydrates. L. J. S.

BARTH (Tom.) & LUNDE (Gulbrand). *Lattice constants of the cuprous and silver halides.* Norsk Geol. Tidsskrift, 1926, vol. 8 (for 1924-5), pp. 281-291.

Re-determinations were made of the lattice-spacings using halite mixed with the materials for direct comparison. The results are:  $\text{CuCl } a = 5.407$ ,  $\text{CuBr } 5.681$ ,  $\text{CuI } 6.047$ ,  $\text{AgCl } 5.545$ ,  $\text{AgBr } 5.755$ ,  $\text{AgI } 6.491 \text{ \AA.}$  Since only  $\text{AgCl}$  and  $\text{AgBr}$  are of the halite type and all the others of the blende type of structure, the shortest atomic distances do not give a comparison of the atomic radii in the two sets of compounds.

L. J. S.

BARTH (Tom.) & LUNDE (Gulbrand). *Contributions to the study of the structure of mixed crystals.* (Preliminary report). Norsk Geol. Tidsskrift, 1926, vol. 8 (for 1924-5), pp. 293-301, 2 figs.

The lattice constants were determined by the X-ray powder method for series of mixed crystals in the systems TlBr-TlI, AgBr-AgI, and CuI-AgI. TlBr is body-centred cubic with  $a = 3.968 \text{ \AA.}$  and TlI is orthorhombic, and mixed crystals of the two types may exist together in the middle of the series. The high-temperature modification of TlI, body-centred cubic with  $a = 4.18 \text{ \AA.}$ , was also obtained. AgBr is cubic of the halite type with  $a = 5.755 \text{ \AA.}$  and AgI is cubic of the blende type with  $a = 6.491 \text{ \AA.}$ ; mixed crystals are of both types, but AgBr can force about 70% AgI into the halite structure, whilst only small quantities of AgBr can be forced into the blende structure. The system AgBr-AgI is isomorphous. CuI is cubic of the blende type with  $a = 6.047 \text{ \AA.}$ , and all the mixed crystals CuI-AgI are of this type. In all these cases the mixed crystals are deeper in colour than their components; this may be due to a distortion of the ions to fit the structure. When the mixed crystals are annealed there is evidence of the migration of material in the solid. Formulae are considered for calculating the lattice constants of the mixed crystals from those of their components.

L. J. S.

OTT (H.). *Das Gitter des Monohydrats des LiCl ( $\text{LiCl} + \text{H}_2\text{O}$ ).* Zeits. Krist., 1926, vol. 63, pp. 231-235, 1 fig.

Work with lithium chloride proves difficult on account of the extreme deliquescence of the salt. It can, however, be kept an indefinite time in carbon tetrachloride. Good crystals of the cubic monohydrate are not available, and X-ray analysis is only possible by the powder method. The elementary cell contains one molecule ( $\text{LiCl} + \text{H}_2\text{O}$ ), and its edge is  $3.82 \text{ \AA.}$  long.

H. H.

ZACHARIASEN (William). *Die Kristallstrukturen von Berylliumoxyd und Berylliumsulfid.* Zeits. Physik. Chem., 1926, vol. 119, pp. 201-213, 4 figs.

For BeO further details are given [Abstr., vol. 3, p. 20]. Beryllium sulphide BeS was prepared as a grey sintered mass (sp. gr. 2.36) by heating beryllium at  $1,000^\circ \text{ C.}$  in  $\text{H}_2\text{S} + \text{H}$ . Examined by the X-ray powder method it was found to be cubic with the blende type of structure and four molecules in the unit cube of edge  $4.85 \text{ \AA.}$

L. J. S.

AMINOFF (G.). *Die Struktur von BeO*. Zeits. Krist., 1926, vol. 63, pp. 175-176, 1 fig.

A correction of a slip (read  $O^{--} = 10$  for  $O^{--} = 18$ ) in the author's earlier paper [Abstr., vol. 3, p. 5].

H. H.

GOLDSCHMIDT (V. M.), ULRICH (F.), & BARTH (T.). *Geochemische Verteilungsgesetze der Elemente. IV. Zur Krystallstruktur der Oxyde der seltenen Erdmetalle*. Skrifter Norske Vidensk.-Akad. I. Mat.-nat. Kl., Oslo, 1925, no. 5, 24 pp., 2 figs.

—— BARTH (T.), & LUNDE (G.). ——— V. *Isomorphie und Polymorphie der Sesquioxide. Die Lanthaniden-Kontraktion und ihre Konsequenzen*. Ibid., 1925, no. 7, 59 pp., 6 figs.

—— with BARTH (T.), HOLMSEN (D.), LUNDE (G.), & ZACHARIASEN (W.). ——— VI. *Über die Krystallstrukturen vom Rutiltypus, mit Bemerkungen zur Geochemie zweiwertiger und vierwertiger Elemente*. Ibid., 1926, no. 1, 21 pp.

IV. The sesquioxides of the rare-earth metals form three series of crystals, the enantiotropic modifications being stable at different temperatures. Crystalline material was obtained in some cases by fusion in the oxygen-acetylene blowpipe. A large number of products were examined by the X-ray powder method. Crystals *A* are hexagonal with perfect basal cleavage, *B* apparently pseudo-trigonal, and *C* are cubic with space-group  $O_h^{16}$  [corrected in paper VI to  $T^s$ ] and containing sixteen molecules  $R_2O_3$  in the unit cell. The edges of the unit cube are for  $Sc_2O_3$  9.79,  $Yt_2O_3$  10.60 Å., and for the sesquioxides of elements nos. 62-71:

	$Sa_2O_3$	$Eu_2O_3$	$Gd_2O_3$	$Tb_2O_3$	$Dy_2O_3$	$Ho_2O_3$	$Er_2O_3$	$Tm_2O_3$	$Yb_2O_3$	$Lu_2O_3$
At. no.	62	63	64	65	66	67	68	69	70	71
<i>a</i> =	10.85	10.84	10.79	10.70	10.63	10.58	10.54	10.52	10.39	10.37

Here with increasing atomic number in the vertical column of the periodic table there is an increase in the dimensions of the lattice, whilst in the horizontal row there is a decrease. The same relation is shown less completely by crystals of the series *A* and *B*. The dioxides  $CeO_2$  ( $a = 5.402$  Å.) and  $ThO_2$  ( $a = 5.573$ ) are cubic with the fluorite type of structure [Abstr., vol. 2, p. 206]. The intermediate oxides  $Pr_6O_{11}$  ( $a = 5.488$  or  $10.98$ ) and  $Tb_4O_7$  ( $a = 5.278$  or  $10.55$ ) show the dioxide type predominating and are perhaps mixed crystals  $Pr_2O_3 + 4PrO_2$  and  $Tb_2O_3 + 2TbO_2$ .

V. A further detailed study by X-ray methods of the sesquioxides of the rare-earth and other metals and of their interrelations. The diminution shown above in the lattice dimensions of the 'lanthanides' (Ce-Lu, 58-71) is called the 'lanthanide contraction' [Abstr., vol. 3, p. 17]; it is said to account for the high density of the elements (Ta, W, Pt, Au) immediately following in the periodic table, and for the close relation between Hf and Zr. Indium and thallium sesquioxides  $\text{In}_2\text{O}_3$  ( $a = 10.12 \text{ \AA.}$ ),  $\text{Tl}_2\text{O}_3$  ( $a = 10.57$ ) belong to the *C* type, and they form mixed crystals  $\text{In}_2\text{O}_3\text{-Ga}_2\text{O}_3$ ,  $\text{Tl}_2\text{O}_3\text{-Yt}_2\text{O}_3$ . Other mixed crystals of the same type are  $\text{Al}_2\text{O}_3\text{-Sc}_2\text{O}_3$ ,  $\text{Al}_2\text{O}_3\text{-La}_2\text{O}_3$ ,  $\text{Yt}_2\text{O}_3\text{-Bi}_2\text{O}_3$ , &c.  $\text{Al}_2\text{O}_3$  is trimorphous [Abstr., vol. 3, p. 21]. In these complex series of modifications there are two types of polymorphism: 'structure-types' showing a wide difference, as in quartz and tridymite; and 'structure-variants', where the difference is less, as in  $\alpha$ -quartz and  $\beta$ -quartz.

VI. The crystal-structures of compounds of the type  $\text{RX}_2$  are reviewed and many new X-ray data are recorded. 'Monorutiles' include the difluorides  $\text{MgF}_2$ ,  $\text{MnF}_2$ ,  $\text{FeF}_2$ ,  $\text{CoF}_2$ ,  $\text{NiF}_2$ ,  $\text{ZnF}_2$ , and the dioxides  $\text{TiO}_2$ ,  $\text{VO}_2$ ,  $\text{MnO}_2$ ;  $\text{NbO}_2$ ,  $\text{MoO}_2$ ,  $\text{RuO}_2$ ,  $\text{SnO}_2$ ,  $\text{TeO}_2$ ;  $\text{WO}_2$ ,  $\text{OsO}_2$ ,  $\text{IrO}_2$ ,  $\text{PbO}_2$ . In compounds  $\text{RX}_2$  possessing a crystal-structure of the fluorite type the ratio of the radii of the ions  $\text{R}:\text{X}$  is greater than 0.67, while in the rutile type it is less than 0.67. In some instances in crystals of the fluorite type the electro-positive and the electro-negative ions occupy reversed positions, e.g. in  $\text{ThO}_2$  and  $\text{Li}_2\text{O}$ , and  $\text{Ni}(\text{NH}_3)_6\text{I}_2$  and  $\text{PtCl}_6\text{K}_2$ . Such substances are said to be 'antismorphic' and they cannot form mixed crystals;  $\text{ThO}_2$ ,  $\text{CdF}_2$ , &c., are 'isofluorites', and  $\text{Li}_2\text{O}$ ,  $\text{Cu}_2\text{S}$  'antifluorites'. Another example of 'antismorphism' is given by the hexagonal pair  $\text{AgI}$  and  $\text{NH}_4\text{F}$ ,  $\text{AgI}$  being an 'isowurtzite' and  $\text{NH}_4\text{F}$  an 'antiwurtzite'. Other compounds  $\text{RX}_2$  forming thin hexagonal or trigonal scales with good basal cleavage belong to the 'stratified lattice' (Schichtengitter) type and include  $\text{MoS}_2$ ,  $\text{CdI}_2$ ,  $\text{ZrS}_2$ ,  $\text{ZrSe}_2$ ,  $\text{Mg}(\text{OH})_2$ ,  $\text{Ca}(\text{OH})_2$ ,  $\text{Mn}(\text{OH})_2$ ,  $\text{Ni}(\text{OH})_2$ ,  $\text{Cd}(\text{OH})_2$ ,  $\text{SnS}_2$ ,  $\text{CoCl}_2$ ,  $\text{NiCl}_2$ ,  $\text{NiBr}_2$ ,  $\text{CuBr}_2$ ,  $\text{ZnBr}_2$ ,  $\text{ZnI}_2$ ,  $\text{CdCl}_2$ ,  $\text{CdBr}_2$ ,  $\text{PbI}_2$ ,  $\text{RuCl}_2$ ,  $\text{RhCl}_2$ ,  $\text{PdCl}_2$ ,  $\text{IrCl}_2$ ,  $\text{PtCl}_2$ . 'Polyrutiles' include mossite ( $\text{Fe}(\text{Nb,Ta})_2\text{O}_6$ ) and tapiolite ( $\text{FeTa}_2\text{O}_6$ ), these being 'trirutiles' consisting of three rutile cells arranged along the *c*-axis. This is an example of 'polymeric isomorphism'. Zircon is an 'octorutile'. Baddeleyite and the Brazilian 'favas' ( $\text{ZrO}_2$ ) are monoclinic, but at a very high temperature zirconia appears to be cubic, probably of the fluorite type.

L. J. S.



WYCKOFF (Ralph W. G.) & CRITTENDEN (E. D.). *The preparation and crystal structure of ferrous oxide.* Journ. Amer. Chem. Soc., 1925, vol. 47, pp. 2876-2882. [Abbreviated translation:] *Herstellung und Kristallstruktur von Ferrooxyd (FeO).* Zeits. Krist., 1926, vol. 63, pp. 144-147, 1 fig.

If four parts of magnetite ( $\text{Fe}_3\text{O}_4$ ) and one of iron are melted in an electric furnace, a black and brittle mass of  $\text{FeO}$  is obtained not markedly ferro-magnetic. This was tested by the Debye method and shown probably to have the halite structure with a fundamental cell containing four molecules and having an edge of  $4.29 \text{ \AA}$ . H. H.

WYCKOFF (Ralph W. G.) & CRITTENDEN (E. D.). *An X-ray examination of some ammonia catalysts.* Journ. Amer. Chem. Soc., 1925, vol. 47, pp. 2866-2876.

Artificial magnetite used as a catalyst in the synthesis of ammonia has a unit cube of edge  $8.37 \text{ \AA}$ . Any excess of  $\text{FeO}$  exists as a separate phase, which disappears when  $\text{Al}_2\text{O}_3$  is added as a 'promoter', but without any appreciable effect on the structure.  $\alpha$ -iron obtained by the reduction of magnetite has a  $2.859 \text{ \AA}$ . L. J. S.

WYCKOFF (Ralph W. G.). *The crystal structure of the high temperature ( $\beta$ -) modification of quartz.* Amer. Journ. Sci., 1926, ser. 5, vol. 11, pp. 101-112, 5 figs.

— *Kriterien für hexagonale Raumgruppen und die Kristallstruktur von  $\beta$ -Quarz.* Zeits. Krist., 1926, vol. 63, pp. 507-537, 8 figs.

Laue pictures of  $\alpha$ -quartz and Laue, powder, and spectrum pictures of  $\beta$ -quartz (stable above  $575^\circ \text{C}$ .) were considered. The  $\alpha$ -quartz has a unit cell of dimensions  $a = 4.90$ ,  $c = 5.393 \text{ \AA}$ , containing three molecules of silica. As the temperature rises towards the inversion-point of  $575^\circ \text{C}$ ., the Laue diagram of  $\alpha$ -quartz assimilates itself to that of the  $\beta$ -modification. The latter belongs to the space-groups 6D-4 and 6D-5. Its hexagonal unit cell has the dimensions  $a = 5.01$ ,  $c = 5.47 \text{ \AA}$  and contains three molecules of silica. In the second paper tables are added giving the spectrum reflections to be expected in the various space-groups of the hexagonal system. H. H.

NIGGLI (Paul). *Beziehung zwischen Struktur und äußerer Morphologie am Quarz.* Zeits. Krist., 1926, vol. 63, pp. 295-311, 13 figs.

A theoretical discussion on the relation between the structure of quartz as revealed by X-rays and the development of faces and zones on the crystals. L. J. S.

KRÜNER (H.). *Die Kristallstruktur des festen Kohlendioxyds.* Zeits. Krist., 1926, vol. 63, pp. 275-283, 4 figs.

A determination of the structure of solid  $\text{CO}_2$  was made by the Seemann-Bohlin method, which agrees with that obtained by J. de Smedt and W. H. Keesom [Abstr., vol. 3, p. 20]. H. H.

KIRKPATRICK (L. Merle) & PAULING (Linus). *Über die Kristallstruktur der kubischen Tellursäure.* Zeits. Krist., 1926, vol. 63, pp. 502-506.

Telluric acid is shown by spectrum and Laue methods to have a unit cell of  $15.48 \text{ \AA}$ . containing thirty-two molecules of  $\text{Te}(\text{OH})_6$  with the space-group  $O_h^8$ . H. H.

CARDOSO (G. M.). *Feinbauliche Untersuchungen am Epsomit.* Zeits. Krist., 1926, vol. 63, pp. 19-33, 10 figs.

The structure of epsomite was determined by Laue diagrams and spectroscopic methods. The space-group is  $V^4$ . The fundamental cell contains four molecules, its dimensions being given by  $a = 11.91$ ,  $b = 12.02$ ,  $c = 6.87 \text{ \AA}$ . H. H.

BRADLEY (A. J.). *The crystal structure of lithium potassium sulphate.* Phil. Mag., 1925, ser. 6, vol. 49, pp. 1225-1237, 3 figs.

The sulphate and lithium ions have a close-packed hexagonal arrangement, while the potassium ions form a simple hexagonal lattice. The unit cell containing two molecules  $\text{LiKSO}_4$  has  $a = 5.13$ ,  $c = 8.60 \text{ \AA}$ . The space-group is  $C_6^6$ . In the sulphate ion a tetrahedron of oxygen atoms surrounds a central sulphur atom at distance S-O  $1.5$  to  $1.6 \text{ \AA}$ . L. J. S.

WYCKOFF (Ralph W. G.). *Crystal structure of silver phosphate and silver arsenate ( $\text{Ag}_3\text{XO}_4$ ).* Amer. Journ. Sci., 1925, ser. 5, vol. 10, pp. 107-118, 3 figs. [Translation:] *Die Kristallstruktur von Silberphosphat und Silberarsenat ( $\text{Ag}_3\text{XO}_4$ ).* Zeits. Krist., 1925, vol. 62, pp. 528-539, 3 figs.

The structures of silver phosphate and arsenate were determined by the Laue and powder methods. They belong to the cubic system and have probably the space-group  $T_d^2$ . The fundamental cell contains two molecules, and has an edge  $6.00 \text{ \AA}$ . for  $\text{Ag}_3\text{PO}_4$  and  $6.12 \text{ \AA}$ . for  $\text{Ag}_3\text{AsO}_4$ . H. H.

BRAGG (W. Lawrence) & BROWN (G. B.). *The crystalline structure of chrysoberyl*. Proc. Roy. Soc. London, Ser. A, 1926, vol. 110, pp. 34-63, 7 figs.

BRAGG (W. L.) & BROWN (G. B.). *Die Kristallstruktur von Chrysoberyll* ( $\text{BeAl}_2\text{O}_4$ ). Zeits. Krist., 1926, vol. 63, pp. 122-143, 4 figs.

Chrysoberyl was tested by the ionization-spectrometer and found to belong to the space-group  $V_h^{16}$ . The fundamental cell has dimensions given by  $a = 4.240$ ,  $b = 9.390$ ,  $c = 5.470$  Å., and it contains four molecules. The oxygen atoms have a hexagonal closest-packed arrangement. The aluminium atoms lie in the spaces between them. The position of the beryllium atoms could not be determined. The structure has close analogies with those of  $\text{BeO}$ ,  $\text{Al}_2\text{O}_3$ , and  $\text{MgAl}_2\text{O}_4$ . A crystal-holder with two graduated circles in planes at right angles is figured.

H. H.

HASSEL (O.). *Die Kristallstruktur einiger Verbindungen von der Zusammensetzung  $\text{MRO}_4$ . I. Zirkon  $\text{ZrSiO}_4$* . Zeits. Krist., 1926, vol. 63, pp. 247-254.

L. Vegard gave a structure for zircon [Abstr., vol. 2, pp. 506-7] which has hemihedral symmetry, whereas the crystals are geometrically holohedral. On this account the author undertook a fresh examination of the X-ray rotation diagram, which confirmed Vegard's result and gave  $D_{4h}^{19}$  as the space-group.

H. H.

BRAGG (W. L.) & BROWN (G. B.). *Die Struktur des Olivins*. Zeits. Krist., 1926, vol. 63, pp. 538-556, 3 figs.

The structure of gem olivine from the Red Sea was determined by means of the ionization-spectrometer. Its space-group is  $V_h^{16}$ . The unit cell contains four molecules  $\text{Mg}_2\text{SiO}_4$  and has the dimensions  $a = 4.755$ ,  $b = 10.21$ ,  $c = 5.985$  Å.

H. H.

AMINOFF (G.). *Zur Kristallographie des Trimerits*. Geol. För. Förh. Stockholm, 1926, vol. 48, pp. 19-43, 16 figs.

Trimerite, previously known only from the Harstigen mine, has recently been found in calcite streaks in the granular haematite ore of Långban, Sweden. Goniometric measurements do not distinguish the crystals from hexagonal with pyramidal hemihedrism. Taking the predominating pyramid as  $(10\bar{1}1)$ , the axial ratio is  $a:c = 1:0.9406$ , and the forms are  $c(0001)$ ,  $m(10\bar{1}0)$ ,  $n(11\bar{2}0)$ ,  $p(10\bar{1}1)$ ,  $z(30\bar{3}2)$ ,  $q(11\bar{2}2)$ ,  $o(21\bar{3}2)$ , and  $y(41\bar{5}2)$ ,  $zqy$  being new forms. Examined optically through the basal

plane, the crystals show complex lamellar twinning and are really monoclinic (or possibly triclinic as suggested by W. C. Brögger, 1891). One crystal found is, however, simple and nearly free from twin-lamellae; this is monoclinic with  $a:b:c = 2.0834:1:2.1130$ ,  $\beta = 59^\circ 51'$ . A study of the directions of optical extinction in the lamellae, the striations on the faces, and the etch figures on the basal plane, leads to the conclusion that the twinning is of the 'heteroaxial' type. By a rotation of  $60^\circ$  about the monoclinic axis of symmetry (100) and (001) come together and correspond with the hexagonal prism (10 $\bar{1}$ 0), while the (010) planes lie in the hexagonal basal plane (0001). Laue X-ray photograms through (0001) show a hexad axis and no planes of symmetry; but taking account of the intensities of the spots the symmetry is monoclinic. The rotating crystal method gave  $a = 16.23$ ,  $c = 7.64$  Å. The powder method gave better results  $a = 16.11$ ,  $c = 7.60$  Å. ( $c/a = 0.4717$ , twice the value given by goniometric measurement) for the dimensions of the hexagonal cell containing eight molecules  $\text{CaMn}_2\text{Be}_3(\text{SiO}_4)_3$ . The space-group is  $C_{6h}^1$  or  $C_{6h}^2$ . An orthohexagonal cell of dimensions  $a = 7.60$ ,  $b = 16.11$ ,  $c = 3 \times 9.30$  containing 48 molecules  $\text{Be}(\text{Ca}, \text{Mn})\text{SiO}_4$  is compared with the structure of chrysoberyl and olivine. Whether a truly hexagonal modification of trimerite exists at a higher temperature cannot be decided: but the twin-lamellae do not disappear at a red-heat. L. J. S.

WYCKOFF (Ralph W. G.), MERWIN (Herbert E.), & WASHINGTON (H. S.).

*X-ray diffraction measurements upon the pyroxenes.* Amer. Journ. Sci., 1925, ser. 5, vol. 10, pp. 383-397, 1 fig.

Several pyroxenes of which the chemical composition was known from published analyses (and four new analyses are now given) were examined by the X-ray powder method. They give patterns of four main types: (1) Diopside (including hedenbergite, acmite, jadeite, augite); (2) Enstatite (and hypersthene); (3) Wollastonite (and bustamite, pectolite, schizolite); (4) Rhodonite (and Ca-rich rhodonite). Some others (clinoenstatite, spodumene, alamosite, pyroxmangite, sobralite, babingtonite) give other types of pattern. Since the absolute dimensions of the unit cell are not determinable, the spacing ratios are compared in each group. For example, taking diopside as 1.000, acmite gives 0.994, and hedenbergite 1.004. The replacement of MgO by FeO produces practically no change in the structure; MnO has a slightly greater volume, and CaO an appreciably greater volume. In augite the excess  $\text{Fe}_2\text{O}_3$  and  $\text{Al}_2\text{O}_3$  have no appreciable effect. L. J. S.



WYCKOFF (Ralph W. G.) & MERWIN (H. E.). *Die Raumgruppe von Diopsid  $\text{CaMg}(\text{SiO}_3)_2$* . Zeits. Krist., 1925, vol. 62, pp. 540-552, 4 figs. [Cf. Abstr., vol. 2, p. 505.]

BOWEN (N. L.) & WYCKOFF (R. W. G.). *A petrographic and X-ray study of the thermal dissociation of dumortierite*. Journ. Washington Acad. Sci., 1926, vol. 16, pp. 178-189, 3 figs.

The effect of heating dumortierite ( $3\text{Al}_2\text{O}_3 \cdot 6\text{SiO}_2 \cdot \text{B}_2\text{O}_3 \cdot \text{H}_2\text{O}$ ) was studied by means of powder X-ray photographs and by optical methods under the microscope. Heating at  $800^\circ\text{C}$ . produces little effect, beyond loss of the deep-blue colour. At  $950^\circ\text{C}$ . change begins to be appreciable. Comparatively brief exposure to  $1200^\circ\text{C}$ . decomposes a noticeable amount of the mineral, and at  $1500^\circ\text{C}$ . it is completely converted into mullite ( $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ ) with a small amount of silica, the boric oxide and water being driven off. As a basis for refractory bodies dumortierite is to be regarded favourably.

H. H.

WYCKOFF (Ralph W. G.), GREIG (J. W.), & BOWEN (N. L.). *The X-ray diffraction patterns of mullite and of sillimanite*. Amer. Journ. Sci., 1926, ser. 5, vol. 11, pp. 459-472, 4 figs.

Mullite ( $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ ) and fibrolite ( $\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$ ) show X-ray diffraction patterns as given by powder, Laue, and spectrum photographs, which are almost identical, though the very slight differences recorded are probably real. A cell with dimensions  $a = 5.70$ ,  $b = 7.66$ ,  $c = 2.85 \text{ \AA}$ . would contain two molecules of fibrolite but only three-quarters of a molecule of mullite. Probably the true unit is some multiple of this cell.

H. H.

WYCKOFF (Ralph W. G.), HUNT (Franklin L.), & MERWIN (Herbert E.). *On the X-ray diffraction effects from solid fatty acids*. Science, New York, n. ser., vol. 61, pp. 613-614. [Translation:] *Über die Röntgeninterferenzen an festen Fettsäuren*. Zeits. Krist., 1925, vol. 62, pp. 553-556.

X-ray experiments with palmitic acid show that it is deposited from solution in acetone as a monoclinic or triclinic crystalline substance. They give no support to the view that such fatty acids solidify in a form which is intermediate between the amorphous and crystalline states.

H. H.

### Crystals as Radio-detectors.

JAMES (Alfred Clive). *The rectification of alternating currents by crystals*. Phil. Mag., 1925, ser. 6, vol. 49, pp. 681-695, 4 figs.

Crystals were prepared by heating the precipitated sulphides with a little sulphur and cooling very slowly. Pure lead sulphide shows a greater conductivity when the metallic point of contact is negative than when positive, the ratio of the current being 1.03 : 1 along a tetrad axis, 1.23 : 1 along a triad axis, and 15.9 : 1 [ $\approx$  1.59 : 1] along a diad axis. At 160° C. there is a rapid increase of the conductivity in both directions. These differences are increased by the addition of 10 % silver sulphide, and decreased by 5 % SnS. A modification of the electrolytic theory is suggested. A direct current with a negative contact point causes the formation of metallic threads in the sulphide; and when the contact point is positive a high-resistance film is formed. In rectification the metal ions oscillate to and fro through fixed channels of sulphur ions, giving metallic and non-metallic contact alternately. L. J. S.

WHERRY (Edgar T.). *Radio-detector minerals*. Amer. Min. 1925, vol. 10, pp. 29-31.

A large number of minerals were tested, using a copper 'cat's whisker'; about 75 were found to possess more or less radio-detector properties, and are tabulated as 'good', 'fair', and 'poor'. Those classed as 'good' are artificial silicon, impure pyrite, tennantite, enargite, artificial zinc oxide, and impure galena. Most of the substances are moderate conductors of electricity. Sulphides are usually better than oxides of the same metals, and selenides sometimes better than sulphides. The theory of Roberts and Adams [Abstr., vol. 2, p. 37] that sensitive spots on crystals consist of layers of only one kind of atom is insufficient. In some cases such layers are normal to polar axes, and the detector properties may be due to a one-sided attraction of the electron layers. In most minerals the presence of certain impurities improves the detector properties, due perhaps to resulting irregularities in the crystal-structure. L. J. S.

HAWKINS (A. C.). *Directional factors in radio crystal detectors*. Amer. Min., 1926, vol. 11, pp. 164-165.

The different faces of crystals were tried with a 'cat's whisker' for radio-detection. The octahedron faces of galena give much better results than the cube faces. In pyrites the octahedral faces are the best, cube faces the next, and the pyritohedron and diploid faces rather inferior. L. J. S.

GAUBERT (P.). *Sur la détection et le facies des cristaux de galène et de pyrite*. Compt. Rend. Acad. Sci. Paris, 1926, vol. 182, pp. 143-146.

Crystals of galena and pyrite of different habits were examined for radio-detection. In galena, crystals of octahedral habit are good detectors, whilst cubes are bad detectors. With pyrite the reverse is the case, cubes and crystals of the combination (100) (210) being good and octahedra bad. Pure galena crystallizes as cubes and pure pyrite as octahedra, and the radio-detection is therefore ascribed to impurities. It is suggested that these impurities have been deposited as layers on the new faces that they have induced; and that these layers act like the film of a dielectric on metal, as in the detectors produced by H. Pélabon (1925).  
L. J. S.

CADY (W. G.). *The piezo-electric resonator*. Proc. Inst. Radio Engineers, New York, 1922, vol. 10, pp. 83-114, 11 figs.

The general theory of piezo-electricity is summarized, and the equations applicable to quartz are stated. The 'concentrated mass theory' of longitudinal vibrations in rods is then developed, and the properties of the 'resonance circle' discussed. On this theoretical basis the equations for the reaction of a piezo-electric resonator upon a circuit are derived. The construction and operation of quartz and of quartz-steel resonators is described, and an account is given of their application as wave-length standards and as frequency-stabilizing devices.  
L. J. S.

DYE (D. W.). *The piezo-electric quartz resonator and its equivalent electric circuit*. Proc. Physical Soc. London, 1926, vol. 38, pp. 399-458, 32 figs.

A detailed experimental examination and theoretical discussion of the piezo-electric quartz resonator introduced by W. G. Cady, with references to the literature.  
L. J. S.

### Precious Stones.<sup>1</sup>

ADAMS (Frank D.). *A visit to the gem districts of Ceylon and Burma*. Bull. Canadian Inst. Mining Metall., 1926, no. 166, pp. 213-246, 11 figs. [To be issued later in the Transactions, vol. 29 (for 1926).]

The gem-minerals of Ceylon are won, chiefly in the Balangoda, Rakwana, and Ratnapura districts, from gravel deposits ('illam') along the borders of streams that flow over Archaean rocks. They are only

<sup>1</sup> See also p. 157.

very rarely seen in the mother-rock; aquamarine was seen by the author in quartz-pegmatite. New workings were visited at Pelmadulla, 12 miles SW. of Ratnapura; here excellent blue sapphires, one or two pounds in weight, have been found. In Upper Burma there are three ruby-bearing areas, those of Mandalay, Mytkynia, and around Mogok; the last is the most important, and working is now carried on at Enjouk, Bigom, Nanyasan, and especially at Kathe, eight miles west of Mogok. The mother-rock is a white crystalline limestone often containing graphite, phlogopite, &c., and with many interstratified bands of light-coloured gneisses, chiefly plagioclase-scapolite-gneiss. The idea of J. W. Judd (1896) that the limestone was derived from pyroxene-gneiss is controverted. Pockets of rubies are occasionally found in the limestone; and a large sapphire was seen in a white granular felspar-rock (micro-perthite). The workings are in the residual clay ('byon') filling fissures and caves in the limestone and covering the hill-slopes and valley-floor. The concentrate from the mill contains ruby, sapphire (blue, yellow, white), spinel (usually pink), common opaque corundum, tourmaline, zircon, quartz, beryl, scapolite, apatite, and very rarely fibrolite. The road from Thabeikkyin on the Irrawaddy eastward to Mogok runs for forty miles across the strike of these Archaean rocks, which present a striking resemblance to the Grenville series in Canada. At one place on the road-side is a coarse-grained nepheline-rock (urtite) containing aegirine-augite and much primary calcite, and closely associated with limestone. Near Sakangei a pegmatite dike 100 feet wide cutting granite is much kaolinized and carries large crystals of clear quartz, plates of lepidolite, good crystals of clear topaz, and small bunches of cassiterite.

L. J. S.

MICHEL (H.) & RIEDL (G.). *Die Auswertung der Absorptions- und Lumineszenzerscheinungen der Edelsteine zu ihrer Unterscheidung.* Ann. Naturhist. Museum, Wien, 1925, vol. 38 (for 1924), pp. 169-173.

An apparatus is used for comparing the colours of precious stones against a standard scale of colours. An apparatus provided with a disc of coloured screens is also used for distinguishing stones similar in colour; the differences in colour shown by green stones of various kinds when illuminated through two such screens are tabulated as an example. Stones similar in colour can also be distinguished by their luminescent effects when exposed to cathode, Röntgen, or ultra-violet rays.

L. J. S.



MICHEL (Hermann) & PRZIBRAM (Karl). *Blauer Zirkon von Siam und sein Verhalten gegen Becquerelstrahlen*. Anzeiger Akad. Wiss. Wien, Math.-naturwiss. Kl., 1926, vol. 62 (for 1925), pp. 49-52.

The blue zircons from the district of Chantabun, Siam, although water-worn, usually show crystal-faces *m p s a* [Dana's letters]. There is a good cleavage (110), and a separation (111) due to a zonal shelly structure; sp. gr. 4.683. When kept in the dark some stones develop dirty flesh-coloured spots, which disappear in sunlight. When heated to redness the blue colour is lost, and the colour passes through dirty flesh-colour and colourless to pale yellowish-brown. Exposed to radium, the dirty flesh-colour is produced in half a day, and after a longer period the colour is dark reddish-brown, often with a zonal distribution; on exposure to light or by heating to low redness the blue colour is restored. Stones that have been decolorized by heat also acquire the same reddish-brown colour when exposed to radium. During exposure to radium the mineral shows a strong greenish to bluish radio-luminescence, and afterwards a distinct thermo-luminescence. The blue zircon also shows a strong cathode-luminescence.

L. J. S.

BRAUNS (R.). *Die Brechungsexponenten des synthetischen grünen Korundes*. Centralblatt Min., Abt. A, 1926, pp. 233-234.

Artificial gem corundum of green colour ('synthetic tourmaline' or 'synthetic emerald'), which owes its colour to the addition of vanadium and cobalt, has sp. gr., 4.00-4.03 and  $\omega$  1.7687,  $\epsilon$  1.7606 (Na; values for Li and Tl are also given). Pleochroism strong,  $\omega$  yellow-green,  $\epsilon$  blue.

L. J. S.

LE COULTRE (—). *La fabrication des pierres précieuses*. Bull. Soc. Chim. France, 1923, ser. 4, vol. 33, pp. 429-430 (abstract).

Spodumene, artificially prepared in a special electric furnace, has sp. gr. 3.18,  $H. 6\frac{3}{4}$ ,  $n$  1.70, and phosphoresces when exposed to  $\alpha$ - and  $\beta$ -rays. Mention is also made of artificial emerald and of complex silicates and boro-silicates of zirconium.

L. J. S.

FERSMAN (A.). *Historical stones of the „Diamond Treasure“*. Изв. Акад. Наук СССР (Bull. Acad. Sci. URSS), 1925, ser. 6, vol. 19, pp. 721-730, 1 pl.

An account, written in English, is given of some exceptional faceted stones that formed part of the Russian crown-jewels. A diamond table is a cleavage-flake of triangular outline with 7.5 sq. cm. surface and 0.25 cm. thick. An emerald, probably of Colombian origin, weighs

27.05 gm.; a sapphire about 52 gm.; a chrysolite (olivine) 38.55 gm.; and a red spinel about 80 gm. P. N. C.

FERSMAN (A.). *The historic diamond „Orlov“*. Изв. Акад. Наук СССР (Bull. Acad. Sci. URSS), 1926, ser. 6, vol. 20, pp. 1-12, 1 pl., 1 text-fig.

A description is given of the Indian-cut diamond that was given by Prince G. G. Orlov to the Empress Catherine in 1773. It is still mounted in the Russian sceptre and weighs about 40 gm. From a consideration of the conflicting historical details, the conclusion is drawn that this is the same stone as the 'Great Mogul' and also the 'Moon of the Mountains' or 'Darya-i-noor'. P. N. C.

FERSMAN (A.). *The diamond „Shah“*. Акад. Наук СССР (Acad. Sci. URSS), 1926, separate 12 pp., 1 pl., 3 text-figs.

An English translation, with some additions, of a paper previously published in Russian, Bull. Acad. Sci. Russie, 1922, ser. 6, vol. 16, pp. 451-462 [Abstr., vol. 2, p. 234]. L. J. S.

### Rock-forming Minerals and Petrology.

WALKER (T. L.) & PARSONS (A. L.). *The characteristics of primary calcite*. Univ. Toronto Studies, Geol. Ser., 1925, no. 20, pp. 14-17, pl. 1 (figs. 1-4).

Calcite believed to be of igneous origin is described from: (1) a crystalline limestone in contact with pegmatite near Perth, Ontario; (2) a calcite-apatite vein-dike on Turner's Island, Lake Clear, Renfrew Co., Ontario, showing many phenocrysts of apatite with some of augite, scapolite, and sphene embedded in calcite; (3) crystalline calcite in pegmatite near Hybla, Hastings Co., Ontario. The material shows a prominent cleavage or parting  $e(01\bar{1}2)$  with pearly lustre, this structure being well brought out on the weathered surfaces; also optical anomalies represented by uneven extinction and biaxiality with  $2E$  about  $15^\circ$ . Analysis by H. C. Rickaby of the calcite from Lake Clear gave:  $CO_2$  43.68,  $FeO$  0.72,  $MnO$  0.28,  $MgO$  0.22,  $CaO$  54.88,  $H_2O$  0.25 = 100.03: sp. gr. 2.70. It is suggested that these characters may serve as criteria for the recognition of igneous calcite [they point rather to the effect of pressure]; and that such calcite originated by the inversion of  $\alpha$ -calcite, which was formed by igneous fusion above  $970^\circ C.$ , this being a new point on the geological thermometer. L. J. S.

BOWEN (N. L.). *The Fen area in Telemark, Norway*. Amer. Journ. Sci., 1924, ser. 5, vol. 8, pp. 1-11, 3 pls., 1 text-fig. (map).

The conclusion of W. C. Brögger [Abstr., vol. 2, p. 165] that the alkali-syenites of this area contain primary calcite and grade into magmatic carbonate rocks is discussed, and an alternative explanation offered. A study of micro-sections shows the replacement of silicates, particularly feldspars, by calcite; and in the area there are progressive zones of replacement: (1) sporadic calcite replacement and vein formation; (2) zone of calcite replacement; (3) dolomite replacement; (4) zone of chalybite replacement with workable ores of iron. L. J. S.

BRAUNS (R.). *Primärer Calcit in Tiefengesteinen oder Verdrängung der Silikate durch Calcit?* Centralblatt Min., Abt. A, 1926, pp. 1-8, 2 figs.

The presence of calcite as a primary constituent (in addition to secondary calcite) in the igneous rocks of the Fen district in Norway was described by W. C. Brögger (1920). This has been disputed by N. L. Bowen (1924). These rocks are strikingly similar to the ejected blocks of the Laacher See district in Rhineland, among which R. Brauns [Abstr., vol. 2, p. 288] has described calcite-syenite and calcite-pegmatite. Primary calcite forms irregular grains of some size irregularly intergrown with the other primary minerals (the presence of twin-lamellae  $e(01\bar{1}2)$  is no criterion); whilst secondary calcite occurring as a later infiltration replacing silicates usually forms an aggregate of small cloudy grains. Pseudomorphs of calcite after olivine in a dolerite from the Dillenburg district, Nassau, are figured and described in this connexion. L. J. S.

BOWEN (N. L.). *Die Carbonatgesteine des Fengebietes in Norwegen*. Centralblatt Min., Abt. A, 1926, pp. 241-245.

BRAUNS (R.). *Bemerkung hierzu*. Ibid., p. 245.

Polemical.

L. J. S.

[LEVINSON-LESSING (F. Y.)] Левинсон-Лессинг (Ф. Ю.). О "сакалавиттах"

Лакруа и о различных методах обозначения кислотности изверженных пород при помощи коэффициентов и параметров.—LOEWINSON-LESSING (F.). *Sur les "sakalavites" de M. Lacroix et sur les différents modes de représentation de l'acidité des roches éruptives au moyen de paramètres et de coefficients*. Изв. Геол. Ком. (Bull. Com. Géol.), Leningrad, 1925, vol. 43 (for 1924), pp. 491-513 (French résumé, p. 513), 1 table.

One of the most important chemical characters of igneous rocks is the ratio of silica to bases. The author had distinguished saturated, un-

saturated, and over-saturated rocks as long ago as 1890—previous to S. J. Shand in 1913 [Abstr., vol. 1, p. 94]. He had also in 1897 introduced the idea of acidity coefficient. Modifications of this idea have since been suggested by several other authors (Cross-Iddings-Pirsson-Washington, Fedorov-Svitalsky, Hommel, Niggli, Osann, Ginsberg, Wolff, Becke), but the author believes that these apply only to plutonic rocks, and not to volcanic rocks. Q [quartz] in the C.I.P.W. system is a fiction. The author's coefficients  $\alpha$ ,  $\beta$ , and  $\gamma$  apply to all igneous rocks and are real. The 'sakalavites' of Lacroix [Abstr., vol. 2, p. 228] include two special types of basaltic rocks—andesito-basalt and trachydolerite of the author.

P. N. C.

[SMIRNOV (S.)] Смирнов (С.). Предварительный отчет о минералогических исследованиях летом 1923 г. в районе ст. Слюдянки Круго-Байкальской ж. д. *Rapport préliminaire sur les explorations minéralogiques exécutées dans la région de la station Slioudianka du chemin de fer circum-Baikalien durant l'été 1923.* Изв. Геол. Ком. (Bull. Com. Géol.), Leningrad, 1925, vol. 43 (for 1924), pp. 549–563 (French résumé, pp. 562–563), 1 fig.

Deals mainly with the phlogopite deposits of Slyudyanka, which are very similar to those of Canada. They form short veins and nests in rocks of various kinds (amphibolite, limestone, pegmatite, &c.). Associated minerals are diopside ('baikalite'), calcite, apatite ('moroxite'), and scapolite ('stroganovite'), sometimes hornblende and perthite-felspar. The veins show a banded structure. The same minerals are sometimes of metasomatic origin, due to processes following a granite intrusion. The deposits are rich in phlogopite, and no doubt others will be found in the same neighbourhood. Pegmatite veins are widely distributed. The main constituents are microcline-perthite, albite, and quartz, with accessory aegirine, augite, biotite, muscovite, and hornblende, also sphene, zircon, magnetite, orthite, two kinds of garnet, black tourmaline, apatite, fluorite, and very rarely the uraniferous mineral mendelyevite [Abstr., vol. 2, p. 147].

P. N. C.

[ЛОДОСНИКОВ (V. N.)] Лодосников (В. Н.). Несколько интересных пород с южных отрогов Алтая.—ЛОДОСНИКОВ (V. N.). *Quelques roches intéressantes des embrenchements [sic] méridionaux de l'Altai.* Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1923, ser. 2, vol. 51, pp. 424–454, 15 figs.

Descriptions are given of the microscopical characters of cordierite-hypersthene-hornfels (with biotite, magnetite, and anthophyllite), injected



biotite-schist, haematite-schist, actinolite-schist, amphibolite (sometimes with prehnite), granite, aplite, pegmatite, quartz-biotite-diorite, diorite, gabbro-diorite, quartz-norite, gabbro, and gabbro-diabase. In a prehnitic epidiorite the prehnite shows unusual optical characters:  $\gamma - \beta$  0.018,  $\gamma - \alpha$  0.024 to 0.027,  $2V$   $68^\circ$ , positive. In quartz-norite a regular intergrowth of hypersthene and hornblende is described. P. N. C.

[ЛОДОСНИКОВ (V. N.)]. Лодосников (В. Н.) Микроскопические наблюдения полевых шпатов и выводы из них в породах Кальдзирской волости, Зайсанского уезда, Семипалатинской области.—ЛОДОСНИКОВ (V. N.). *Recherches microscopiques des feldspats et les conclusions tirées pour les roches du [Kaldzhirsk commune] district de Zaïssane (gouv. Sémipalatinsk)*. Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1925, ser. 2, vol. 52, pp. 61–144, 12 figs.

Optical data and the twin-laws determined by the Fedorov method are tabulated for 390 Na-Ca-feldspars and 102 K-Na-feldspars from granite, diorite, gabbro, porphyry, and metamorphic rocks. A comparison is made between the stereographic diagrams of Fedorov and Becke for the twin-laws, and preference is given to the former. A diagram (p. 106) shows the relative frequency of the twin-laws in plagioclase of different composition. In pure albite (nos. 0–5 in Fedorov's numbering 0–100 for the plagioclases) 61 % of the twins are albite-twins, and 31.7 % Carlsbad-twins; for nos. 5–20 both laws are about equally represented; whilst for typical oligoclase (nos. 21–25) Carlsbad-twins are 80 % and albite-twins 6.7 %. In igneous rocks twins with (010) as the combination-plane (viz. albite-, Carlsbad-, and some other complex twins) predominate; in 287 measured examples these form 94.1 %, whilst those with (001) for combination-plane form only 5.9 %. In metamorphic rocks, as far as the few measurements show, the reverse is the case. The causes of these differences and the effect of pressure are discussed. An irregular intergrowth of albite in albite from an albite-granite-aplite is called albite-isoperthite. It is concluded that there is no essential difference between orthoclase, microcline, and anorthoclase, and that they may be either primary or secondary.<sup>1</sup> P. N. C.

[ПОЛОВИНКИНА (Y. I.)]. Половинкина (Ю. Пр.). О некоторых интересных амфиболах из пород Кривого Рога.—ПОЛОВИНКИНА (I.). *On some interesting amphiboles from the rocks of Krivoy Rog*. Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1924, ser. 2, vol. 53, pp. 199–234 (English summary, pp. 231–234), 9 figs.

Cummingstonite from cummingstonite-schist (containing also magnetite, some quartz, and bright-green hornblende) from Krivoy Rog, Ukraine,

is prismatic in habit, frequently with polysynthetic twinning, and colourless in thin section. It has  $\gamma : c = 14-15^\circ$ ,  $2V\ 88^\circ$ , negative,  $\alpha\ 1.667$  (Na),  $\gamma\ 1.698$ ,  $\gamma - \alpha\ 0.029$ . In daylight  $\rho > v$ ; for axis B  $\rho$  to  $v\ 6^\circ$ , and for axis A  $2^\circ$ . Analysis I by E. A. Sverzhinskaya corresponds with  $\text{FeSiO}_3\ 63.20$ ,  $\text{MgSiO}_3\ 12.46$ ,  $\text{H}_2\text{SiO}_3\ 14.08$ ,  $\text{CaO} \cdot 3\text{MgO} \cdot 4\text{SiO}_2\ 3.36$ ,  $\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 4\text{SiO}_2\ 1.32$ ,  $\text{MgO} \cdot (\text{Al}, \text{Fe})_2\text{O}_3 \cdot \text{SiO}_2\ 7.38\%$ . Alkali-amphiboles from the Ternovsky mine include a new variety *ternovskite* (anal. II) and tremolite-glaucophane (anal. III). Ternovskite has the optic axial plane in (010),  $\gamma : c = 27-35^\circ$ ,  $2V\ 42^\circ$  negative,  $\alpha\ 1.655$ ,  $\beta\ 1.664$ ,  $\gamma\ 1.668$  (Na). The dispersion of the birefringence is  $\rho < v$  for  $\gamma - \alpha$ , but  $\rho > v$  for  $\beta - \alpha$ :

$\lambda$	...	...	656	589	540	486	464
$\gamma - \alpha$	...	...	0.0119	0.0124	0.0135	0.0140	—
$\beta - \alpha$	...	...	0.0096	0.0089	0.0082	0.0075	0.0070

Macroscopically the mineral is blue and in thin section rather pale. Pleochroism is strong:  $\gamma$  pale yellow,  $\beta$  pale violet,  $\alpha$  pale bluish-green. Analysis II corresponds with  $\text{R}_2\text{O} \cdot \text{R}_2\text{O}_3 \cdot 4\text{SiO}_2\ 41.22$ ,  $\text{CaO} \cdot 3\text{MgO} \cdot 4\text{SiO}_2\ 20.08$ ,  $(\text{Mg}, \text{Fe})\text{O} \cdot \text{SiO}_2\ 26.64$ ,  $\text{RO} \cdot \text{R}_2\text{O}_3 \cdot 4\text{SiO}_2\ 12.06$ . The colourless to greenish tremolite-glaucophane [cf. Abstr., vol. 3, p. 85] has  $\gamma : c = 15^\circ$ ,  $2V\ 76-80^\circ$ , negative,  $\alpha\ 1.621$ ,  $\gamma\ 1.640$ ,  $\gamma - \alpha\ 0.019$ ,  $\beta - \alpha\ 0.012$ . Anal. III corresponds with  $\text{R}_2\text{O} \cdot \text{R}_2\text{O}_3 \cdot 4\text{SiO}_2\ 32.31$ ,  $\text{CaO} \cdot 3\text{MgO} \cdot 4\text{SiO}_2\ 66.00$ ,  $\text{MgO} \cdot \text{SiO}_2\ 3.38$ .

	$\text{SiO}_2$	$\text{TiO}_2$	$\text{Al}_2\text{O}_3$	$\text{Fe}_2\text{O}_3$	$\text{FeO}$	$\text{MgO}$	$\text{CaO}$	$\text{Na}_2\text{O}$	$\text{K}_2\text{O}$	$\text{H}_2\text{O}$	Total
I.	49.44	trace	3.27	1.99	37.69	5.82	0.39	0.23		2.10	100.93
II.	52.72	0.31	3.65	15.46	8.16	9.16	2.10	5.91	0.68	1.85	100.00
III.	54.04	1.15	3.84	8.32	trace	17.77	7.73	5.38	0.28	1.49	100.00

P. N. C.

[НИКИТИН (V. V.)] НИКИТИН (B. B.). Явление узловых параллелограммов в двойниках плагиоклаза.—НИКИТИН (B.) [sic]. *Le phénomène des parallélogrammes des noeuds dans les macles des plagioclases*. Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1924, ser. 2, vol. 53, pp. 7-40 (French résumé, pp. 39-40), 1 pl., 2 text-figs.

A detailed optical and theoretical discussion of the rare phenomenon called node parallelograms (see Plate I in the original) observed at the points of intercrossing of albite lamellae in the plagioclase of a gabbro from the Ural.

P. N. C.

TSUBOI (Seitarô). *The genetical interpretation of extrusive rocks*. Journ. Fac. Sci. Univ. Tokyo, Sect. II, 1925, vol. 1, pp. 77-86, 1 fig.

As illustrated by an equilibrium diagram, it is shown that the bulk analysis of an extrusive igneous rock does not represent the composition

of the magma from which it separated. The compositions of the ground-mass and of the porphyritic crystals are of greater significance.

L. J. S.

[BELYANKIN (D. S.)] Белянкин (Д.). Второе издание диаграммы светопре-  
ломления калинатровых полевых шпатов.—BIÉLIANKINE (D.). *Seconde  
édition de la diagramme de réfraction des feldspats potasso-sodiques.*  
Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1925, ser. 2, vol. 52,  
pp. 196–219, 1 fig.

Additional data (refractive indices and chemical composition) for  
anorthoclase and microcline are plotted on the diagram [Abstr., vol. 1,  
p. 89].

P. N. C.

FELLENBERG (Th. von) & LUNDE (Gulbrand). *Untersuchungen über das  
Vorkommen von Jod in der Natur. X. Mitteilung: Beitrag zur  
Geochemie des Jods.* Biochem. Zeits. Berlin, 1926, vol. 175, pp. 162–  
171.

FELLENBERG (Th. de) & LUNDE (Gulbrand). *Contribution à la géochimie  
de l'iode.* Norsk Geol. Tidsskrift, 1926, vol. 9, pp. 48–64.

Estimations were made of the amounts of iodine and bromine in various  
minerals and rocks. Details are given of the methods of analysis and the  
purification of the reagents. A limestone 'rich in iodine' contained  
5.6 mg. I per kg.; granite 0.2 I and 2 Br; sodalite 0.9 I and 2 Br.  
In a pegmatite there was found more iodine in the muscovite than in the  
microcline and very little in the albite. Rock-forming minerals containing  
halogens (scapolite, apatite, &c.) are not always the richest in iodine.  
It is concluded that iodine and bromine are 'lithophil' elements.

L. J. S.

TSUBOI (Seitarô). *A dispersion method of finding the principal refractive  
indices of a crystal in powders.* Journ. Geol. Soc. Tokyo, 1925,  
vol. 32, pp. 1–6, 2 figs.

— *A dispersion method of discriminating rock-constituents and its use  
in petrogenic investigation.* Journ. Fac. Sci. Univ. Tokyo,<sup>1</sup> Sect. II,  
1926, vol. 1, pp. 139–180, 17 figs.

A recapitulation of the dispersion method for the rapid determination  
of refractive indices [Min. Mag., 1923, vol. 20, p. 108]. For the discrimi-  
nation of rock-forming minerals a determination of the refractive indices  
 $n_1$  and  $n_2$  in cleavage-flakes is sufficient [Abstr., vol. 2, p. 437]. In the

<sup>1</sup> 'Journal of the Faculty of Science, Imperial University of Tokyo', issued in  
five sections, is a continuation of 'Journal of the College of Science' (45 vols.,  
1887–1925).

second paper examples are given showing the application of the method for rapidly tracing the variations in composition of olivine, plagioclase, pyroxene, and hornblende in different parts of a gabbro laccolith; and its help in the solution of various petrogenic problems is suggested.

L. J. S.

Irô (Tei-ichi). *Zonal growth of plagioclase and soda-orthoclase in syenitic magma.* Journ. Fac. Sci. Univ. Tokyo, Sect. II, 1925, vol. 1, pp. 105-109, 5 figs.

Crystals of felspar in syenite from Meisen, Korea, consist of a core of plagioclase, ranging from  $Ab_{40}An_{60}$  inside to  $Ab_{60}An_{40}$  outside, surrounded by a zone of soda-orthoclase. The latter has  $\beta$  1.528,  $\gamma$  1.529,  $2V$   $48^\circ$  (Na). The growth of such zoned crystals from the magma is discussed with the aid of equilibrium diagrams.

L. J. S.

SUZUKI (Jun). *On the glaucophane schists in Japan.* Japanese Journ. Geol. Geogr., 1924, vol. 3, no. 1, Abstract p. (1) [from Journ. Geol. Soc. Tokyo, 1924, vol. 31, pp. 1-17, Japanese].

Glaucophane-schists are widely distributed, though in small amounts, in the crystalline-schists of Japan. They are deep-blue in colour with silky lustre and highly schistose structure. Their mineralogical composition is variable at different localities; glaucophane is the main constituent, while epidote, garnet, plagioclase, or sericite occur as accessories. These rocks, including glaucophanite, glaucophane-epidote-schist, and glaucophane-sericite-schist, are considered to have been formed by the dynamo-metamorphism of basaltic lavas or tuffs containing nepheline or other soda-rich minerals, probably in the 'epi-zone' of U. Grubenmann.

L. J. S.

SUZUKI (Jun). *On the piedmontite schists of Japan.* Japanese Journ. Geol. Geogr., [1926], vol. 3 (for 1924), no. 3-4, pp. 135-149, 1 pl., 1 text-fig. (map).

Piedmontite-schists are characteristic members of the Sambagawan series (Archæan), which is extensively developed in the outer zone of Japan. They are deep-violet in colour and highly schistose, and they occur as thin bands in other metamorphic rocks, such as chlorite-, amphibole-, graphite-, and sericite-quartz-schist. According to the relative amounts of the constituent minerals, three types are distinguished, viz. piedmontite-sericite-quartz-schist, piedmontite-sericite-calcite-quartz-schist, and piedmontite-haematite-sericite-quartz-schist. Other minerals



present are albite, epidote, and garnet, with accessory sphene, rutile, tourmaline, and kyanite. Two chemical analyses are given. The rocks are considered to be re-crystallization products of siliceous and slightly calcareous sediments, and formed by moderate dynamo-metamorphism between the 'epi-zone' and 'meso-zone' of U. Grubenmann. L. J. S.

YAMANARI (Fujimaro). *Soda-pyroxenes in the Tertiary and post-Tertiary alkaline rocks from the environs of the Sea of Japan.* Japanese Journ. Geol. Geogr., [1926], vol. 3 (for 1924), no. 3-4, pp. 105-111, 1 fig.

Seven kinds of pyroxene are distinguished in the alkali-rocks of Korea and islands in the Sea of Japan, namely hypersthene, basaltic augite, titaniferous augite, trachyaugite, Korea-augite, aegirine-augite, and aegirine. The optical characters of these are tabulated and compared. Korea-augite is abundant as phenocrysts or minute rods in hakutolite (a kind of acidic alkali-trachyte resembling pantellerite) from Tonghodon, Korea; optically negative,  $\beta = b$ ,  $\gamma : c = -10^\circ$ ; pleochroism weak,  $\alpha$  and  $\beta$  light-yellow or greenish-yellow,  $\gamma$  gold-yellow; cleavage (100) and (010), less often (110); the green mineral readily changes to a yellow bastitic alteration-product. Trachyaugite occurs as phenocrysts and needles in alkali-trachytes and phonolites; it resembles aegirine-augite, but the pleochroism is very weak; optically positive,  $\beta = b$ ,  $\gamma : c = 44^\circ$ ; assuming  $\gamma$  to lie in the obtuse angle  $\beta$ , this would agree with green diopside.

L. J. S.

FERMOR (L. Leigh). *On the basaltic lavas penetrated by the deep boring for coal at Bhaisawal, Bombay Presidency.* Rec. Geol. Survey India, 1925, vol. 58, pp. 93-240, 7 pls., 2 text-figs.

Detailed petrographical descriptions are given of the cores from a boring passing through 1,171 feet of the Deccan trap. The rocks are composed of labradorite, enstatite-augite (with 2V  $21^\circ$ ), iron-ores, primary glass, olivine, and apatite. The olivine is always altered, showing four types of pseudomorphs—to iddingsite, delessite, serpentine, and a substance which is nearly optically isotropic. Secondary minerals include palagonite, chlorophaeite, delessite, green-earth, celadonite, chabazite (some grains of which show an aureole of secondary labradorite), heulandite (showing on (010) striated sectors and cleavages (902) and (305) [Dana's orientation]), ptilolite, apophyllite, quartz, chalcedony, opal, lussatite, and calcite.

L. J. S.

FERMOR (L. Leigh). *Note on the enstatite-augite series of pyroxenes.*  
 Rec. Geol. Survey India, 1925, vol. 58, pp. 323-329.

Attention is called to H. S. Washington's determination of enstatite-augite in the Deccan traps [Abstr., vol. 2, p. 310], and a summary is given of the literature on the minerals of this series. L. J. S.

FERMOR (L. Leigh). *Note on the constitution of glauconite and celadonite.*  
 Rec. Geol. Survey India, 1925, vol. 58, pp. 330-337.

The formula for glauconite proposed by A. F. Hallimond (Min. Mag., 1922, vol. 19, p. 330), namely  $R_2O \cdot 4(R_2O_3, RO) \cdot 10SiO_2 \cdot nH_2O$ , is compared with F. W. Clarke's (1903) formula  $KFe'''Si_2O_6 \cdot aq$  or  $(R_2O, RO) \cdot R_2O_3 \cdot 4SiO_2 \cdot aq$ . Both agree equally well with the mean of the twelve analyses selected and tabulated by Hallimond. The mean of five analyses of celadonite (by M. F. Heddle, 1879) gives the formula  $R_2O_3 \cdot 3(RO, R_2O) \cdot 8SiO_2 \cdot 5H_2O$ , which is very similar to the glauconite formula  $2R_2O_3 \cdot 2(RO, R_2O) \cdot 8SiO_2 \cdot 4\frac{1}{2}aq$ . Combining all the bases, both may be expressed as  $(R_2O_3, RO, R_2O) \cdot 2SiO_2 \cdot nH_2O$ . There seems to be no essential difference between glauconite and celadonite, the principal difference being that of mode of occurrence, namely glauconite in sedimentary rocks and celadonite in igneous (or rarely metamorphic) rocks.

L. J. S.

WADIA (D. N.). *Palagonite-bearing dolerite from Nagpur; suggestions regarding the nature and origin of palagonite.* Rec. Geol. Survey India, 1925, vol. 58, pp. 338-343, 1 pl.

Palagonite as a soft, black, friable material fills ramifying cavities in a coarse-grained dolerite near Nagpur. Thin flakes are dark-orange or grey-green in colour and mainly isotropic with low refraction. It is not a definite mineral, and has been formed in situ by the alteration of the interstitial glass and the ferromagnesian minerals. L. J. S.

SJÖGREN (Hj.)† [1856-1922]. *Analyses collected for an investigation of the rocks of the Falun mine, Sweden.* Geol. För. Förh. Stockholm, 1926, vol. 48, pp. 67-75, 10 figs.

ZENZÉN (Nils). *Some words to accompany the paper by Hj. Sjögren† on »Analyses collected for an investigation of the rocks of the Falun mine, Sweden».* Ibid., pp. 76-83.

Twenty-six detailed analyses by K. Schröder and G. Nyblom are given of rocks from the Falun copper mine, the exact spots where they were collected being given on reproductions of the mine plans. Brief petrographical descriptions by H. E. Johansson are added. The rocks analysed include gneiss, granulite (leptite), soda-granulite (soda-leptite),

cordierite-quartzite, quartz-cordierite-anthophyllite-rock, quartz-amphibolite with cummingtonite, altered 'skül' rocks, &c. L. J. S.

ECKERMANN (Harry von). *A find of boulders of helsinkite in the parish of Alfta*. Geol. För. Förh. Stockholm, 1925, vol. 47, pp. 504-511, 3 pls.

Boulders of helsinkite [Abstr., vol. 1, p. 210] near Alfta in the Woxna valley, Sweden, consist of phenocrysts of pink microcline (18%), albite (31), quartz (28), green epidote (17), chlorite (4.34%), with sphene, ilmenite, and apatite. A chemical analysis of the rock is given and optical data for the albite and epidote. The albite and epidote represent the breaking down of incipient oligoclase in a low-temperature magma rich in water. L. J. S.

BECKE (F.). *Graphische Darstellung von Gesteinsanalysen*. Tschermaks Min. Petr. Mitt., 1926, vol. 37, pp. 27-56, 11 figs.

The relative proportions of various constituents can be expressed by a point in a geometrical figure. For two components a line, for three a triangle, and for four by a point in a tetrahedron ('concentration tetrahedron'). The last can be conveniently represented by projections on different planes. [Cf. Abstr., vol. 1, p. 246; vol. 2, p. 426.]

L. J. S.

KÜHLER (Alexander). *Über einen Floitit aus dem Zentralgneiss der Hohen Tauern*. Tschermaks Min. Petr. Mitt., 1923, vol. 36, pp. 65-79, 1 fig.

The central gneiss of the Hohe Tauern, Salzburg, grades from a very acid type (Forellengneiss of F. Berwerth) through granite-gneiss, syenite-gneiss, and tonalite-gneiss to a basic type. The last is very similar to the floitite (of F. Becke, 1913) from the Floitenthal, Zillertal, Tyrol. It consists of oligoclase, much biotite and epidote, little quartz, and accessory sphene and apatite. This rock, occurring in veins at the Kesselfall, is compared with the original floitite (in which epidote is represented by zoisite and clinozoisite). A chemical analysis is given.

L. J. S.

HALL (A. L.) & NEL (L. T.). *On an occurrence of corundum-sillimanite rock in the norite of the Bushveld igneous complex, west of Lydenburg*. Trans. Geol. Soc. South Africa, [1927], vol. 29 (for 1926), pp. 1-16, 2 pls., 2 text-figs. [Pre-print dated 1926.]

This rock is found in the zone of maximum differentiation within the great norite sheet of the Transvaal, and is directly associated with

anorthosite, fine-grained norite, and chromite seams. The corundum-sillimanite-rock has a maximum width of ten inches, and it is limited both above and below by anorthosite. The minerals present, in addition to the two named, are plagioclase, pleonaste, chrome-picotite, rutile, and a very small quantity of tourmaline, biotite, and pyrites. The corundum forms laths and plates of a fine pink colour, developed parallel to the basal plane. The sillimanite occurs both as fibrolite inclusions in felspar and in dark green, massive form. It is without crystal form, but both its chemical composition and its optical properties indicate that the mineral is sillimanite and not mullite. The seam is thought to represent a metamorphosed aluminous sediment, and the stages of the assumed transformation are discussed. S. J. S.

WILLIS (Bailey) & WASHINGTON (Henry S.). *San Felix and San Ambrosio: their geology and petrology*. Bull. Geol. Soc. Amer., 1924, vol. 35, pp. 365-384, 7 figs.

An account of a visit to these volcanic islands in the Pacific Ocean (500 miles off the coast of Chile). They show only fragments of the old craters, but gas still issues from a crevice at one spot. Petrographical descriptions with chemical analyses are given of a schistose trachyte, hyalo-trachyte, nepheline-basanite, basanite-tuff, and tephritic basalt. L. J. S.

WASHINGTON (H. S.) & KEYES (Mary G.). *Rocks from eastern China*. Journ. Washington Acad. Sci., 1926, vol. 16, pp. 291-301.

The scanty literature on Chinese rocks is quoted: there are very few available chemical analyses. Petrographical descriptions with ten detailed analyses are given of alaskite, biotite-granite, augite-granite, quartz-syenite-porphry, biotite-granodiorite, olivine-basalt, andesine-andesite; and from the syenite area of Shansi [Abstr., vol. 2, p. 229] of augite-syenite, nepheline-syenite (subrang I. 6. 1. 2, named shansose), and pseudoleucite-tinguaite. The last shows phenocrysts of pseudo-leucite, up to 1.5 cm. across, composed of felspar and nepheline with needles of aegirine and natrolite. L. J. S.

FOSHAG (William F.). *The minerals of Obsidian Cliff, Yellowstone National Park, and their origin*. Proc. United States National Museum, 1926, vol. 68, art. 17, 18 pp., 4 pls., 5 text-figs.

The obsidian and its lithoidal equivalent (lithoidite) are described, and a new chemical analysis given of the latter. The minerals of the



lithophysae, include soda-orthoclase, tridymite, cristobalite, fayalite, and quartz. These are described and their origin discussed. L. J. S.

DE ANGELIS (Maria). *Note di petrografia Dancala*. Atti Soc. Ital. Sci. Nat., 1923, vol. 62, pp. 179-200, 1 pl.

DE ANGELIS (Maria). *Note di petrografia Dancala*. (II.) Ibid., 1925, vol. 64, pp. 61-84, 1 pl., 1 text-fig.

Petrographical descriptions with chemical analyses are given of alkali (soda) rocks from Dancalia [Eritrea, NE. Africa]. These include comendites, pantellerites, arfvedsonite-trachytes, and soda-trachyandesites. Anorthoclase phenocrysts gave extinction on (001)  $2^{\circ} 30'$ , on (010)  $10^{\circ}$ ,  $\alpha$  1.522.  $\gamma$  1.528; ext. on (001)  $2^{\circ}-3^{\circ}$ , on (010)  $8\frac{1}{2}^{\circ}-10\frac{1}{2}^{\circ}$ ,  $\alpha$  1.523,  $\gamma$  1.531. A rock called *dancalite*, occurring as small veins in these lavas, contains much analcime, large tabular phenocrysts of white oligoclase (analysis given), prisms of black hornblende, with augite and aegirine-augite, and is regarded as an alkali end-member of the trachyandesite series. L. J. S.

LANDES (Kenneth K.). *The paragenesis of the granite pegmatites of central Maine*. Amer. Min., 1925, vol. 10, pp. 355-411, 7 pls., 5 text-figs.

The minerals present in considerable variety in the pegmatites of Buckfield and Greenwood belong to different periods. I, magmatic phase represented by microcline, &c., with subordinate apatite, green beryl, black tourmaline, lepidolite, biotite, garnet, mispickel, and amblygonite. II, a first hydrothermal phase in which the residual solutions of the magma acted on the minerals already formed with the production of quartz, albite, lepidolite, light-coloured beryl, tourmaline, spodumene, &c. III, a second hydrothermal phase when rhodochrosite, amblygonite, and rare phosphates were deposited. IV, the last hydrothermal solutions deposited chiefly lepidolite, cookeite, quartz, apatite, and herderite. V, a supergene phase when kaolin, montmorillonite, manganite, &c., were produced by the action of ground-water. These changes gave rise to cavities containing well-crystallized minerals and many pseudomorphs. The original minerals of large and striking quartz pseudomorphs from Greenwood are not yet known. (Those described by C. H. Warren in 1898 as being after phenakite are perhaps after analcime.) The various minerals are described in detail with optical data and several chemical analyses by H. E. Vassar. The plates give good photographic reproductions of the minerals. L. J. S.

SHANNON (Earl V.). *The mineralogy and petrology of intrusive Triassic diabase at Goose Creek, Loudoun County, Virginia*. Proc. United States National Museum, 1924, vol. 66, art. 2, 86 pp., 9 pls., 32 text-figs.

—— *Mineralogy and petrography of Triassic limestone conglomerate metamorphosed by intrusive diabase at Leesburg, Virginia*. Ibid., 1925, vol. 66, art. 28, 31 pp., 3 pls., 8 text-figs.

The rocks in a road-metal quarry at this locality include normal diabase, diabase-pegmatite, albitic pegmatite, and aplite veins. These are described and chemical analyses given. The rocks show signs of hydrothermal alteration along numerous joints and fissures, along which secondary minerals are deposited. Crystallized minerals are also found inmiarolitic cavities in the albitic pegmatite. Descriptions are given of some twenty minerals, with crystallographic measurements and figures of crystals. Chemical analyses with optical data are given of pyroxene, asbestiform hornblende, chlorite, prehnite (curious forms of aggregation are figured), stilbite ('epidesmine' habit consisting of three pinakoids at right angles, and presumably orthorhombic), laumontite, and apophyllite.

The second paper gives an account of the action of the magmatic solutions from the crystallizing diabase on the overlying limestone, as seen in the Leesburg quarry in the same diabase sill. Hydrothermal minerals replacing the limestone include diopside, idocrase, magnetite, colerainite, garnet, serpentine, xonotlite [Abstr., vol. 2, p. 530], thaumasite, and wollastonite. Narrow low-temperature veins contain datolite, calcite, apophyllite, diopside (minute white blades), and baryte.

L. J. S.

STUCKEY (Jasper L.). *Chloritoid from the Deep River region, North Carolina*. Amer. Min., 1926, vol. 11, pp. 186-188.

A chloritoid-schist, closely associated with the pyrophyllite deposit in the Womble mine in Moore Co., consists of 30 % chloritoid with quartz, pyrophyllite, chlorite, haematite, magnetite, and accessory epidote. The chloritoid is scattered through the rock as small (1 mm.) green scales with pearly lustre. Sp. gr. 3.45,  $\beta$  1.728,  $\gamma - \alpha$  0.007, positive,  $\gamma$  at 15° with the normal to the base. Pleochroism,  $\gamma$  pale yellow to colourless,  $\beta$  bluish-green,  $\alpha$  yellowish-green. Analysis gave  $\text{SiO}_2$  29.28,  $\text{TiO}_2$  0.86,  $\text{Al}_2\text{O}_3$  37.98,  $\text{Fe}_2\text{O}_3$  2.32,  $\text{FeO}$  21.97,  $\text{MnO}$  0.29,  $\text{MgO}$  1.28,  $\text{CaO}$  trace,  $\text{H}_2\text{O}$  6.04 = 100.02. It is suggested that the chloritoid, like the pyrophyllite, was formed as a replacement by hot solutions.

L. J. S.

MACKIE (William). *Dumortierite in British Rocks*. Trans. Edinburgh Geol. Soc., 1925, vol. 11, p. 352.

Dumortierite is mentioned as present in gneiss, pegmatite, and granite from four localities in Aberdeenshire and Banffshire, and in granite from Cornwall. It is detected by its pleochroism (pale-straw to intense blue, or colourless to intense violet) with maximum absorption in a direction at right angles to that in tourmaline. L. J. S.

KEYES (Mary G.). *Making thin sections of rocks*. Amer. Journ. Sci., 1925, ser. 5, vol. 10, pp. 538-550, 1 fig.

A clear account of the procedure with details of technique as used in the Geophysical Laboratory at Washington. The chip is finished on one side before mounting on the glass-slip. The final grinding is done by hand on finely ground plate-glass, using 'Sira abrasive' (each grain of which consists of a single rounded crystal of aluminium). Special methods are described for friable rocks and those liable to be altered by heat or water. L. J. S.

#### Miscellaneous.

[SUSHCHINSKY (P. P.)] СУЩНСКИЙ (П. П.). Об аквамарине с Шерловой горы в Забайкальской области. [*On aquamarine from Schorl Mtn. in Transbaikalia province.*] Изв. Дон. Полит. Инст. Новочеркасск (Ann. Inst. Polyt. Don, Novotcherkassk), 1923, vol. 8 (for 1920-22), pp. 66-67.

On Schorl Mtn. [Abstr. vol. 2, p. 88] two varieties of aquamarine are found: (1) transparent greenish-blue or pale green prismatic crystals with terminal faces; (2) opaque cylindrical crystals up to 10 cm. long and of a deeper blue colour. The mineral is found in a greisen-like rock and is sometimes embedded in mispickel. In the zone  $a(10\bar{1}0):s(11\bar{2}1)$  the following solution-faces were determined  $(61\bar{7}1)$ ,  $(71\bar{8}1)$ ,  $(81\bar{9}1)$ , and  $(10.1.\bar{1}\bar{1}.1)$ . The crystals show optical anomalies ( $2E$  to  $12^\circ$ );  $\omega$  1.5734,  $\epsilon$  1.5682. Analysis by G. P. Chernik of blue aquamarine very probably from this locality gave:  $\text{SiO}_2$  62.57,  $\text{ZrO}_2$  0.80,  $\text{Nb}_2\text{O}_5$  1.75,  $\text{Al}_2\text{O}_3$  16.57,  $\text{Fe}_2\text{O}_3$  1.73,  $\text{FeO}$  1.16,  $\text{MnO}$  0.31,  $\text{CaO}$  0.36,  $\text{BeO}$  12.81,  $\text{MgO}$  0.35,  $\text{H}_2\text{O}$  1.56, total 99.97; sp. gr. 2.84. P. N. C.

ROSICKÝ (Vojtěch). *O krystalech pyropu od Agua Suja v Brasilii.*—*Sur les cristaux du pyrope de Agua Suja en Brésil.* Publications de la Faculté des Sciences de l'Université Masaryk, Brno, 1926, no. 71, 5 pp., 2 figs., with French résumé 2 pp.

Three crystals of pyrope of cubic habit were measured. Their faces are covered with hemispherical tubercles, and the light-figures indicate

the presence of the forms (320), (210), (311), (211). The author attributes the form of the crystals to magmatic corrosion, this being in agreement with the experiments on almandine of F. Rinne and L. Kulaszewski [Abstr., vol. 3, p. 171]. F. S.

LÄMMLEIN (Georg). *Quarzzwilling nach dem Gesetze  $\mathcal{N}$  von Tiflis*. Zeits. Krist., 1926, vol. 63, pp. 291-294, 2 figs.

A pair of quartz crystals from Mount Sololaki, Tiflis, Trans-Caucasia, was found twinned on Zyn del's law  $\mathcal{N}$ . The crystals have a rhombohedral face in common, one being turned about this face through  $109^{\circ} 39'$  relatively to the other. H. H.

MANASSE (E.) [1875-1922]. *Sulla leviglianite*. Atti (Mem.) Soc. Toscana Sci. Nat. Pisa, 1921, vol. 33, pp. 156-163.

Four specimens, and a small twinned crystal derived from one of them, labelled as leviglianite in the Mineralogical Museum at Florence, from the original locality, the old mercury mines at Levigliani near Serravezza, Tuscany, were examined. On these specimens the mineral occurs as small compact masses associated with cinnabar in mica-schist, and with cinnabar, mercury, and ankerite in quartz veins traversing the schist. Colour and streak, black; fracture, subconchoidal; lustre, metallic; sp. gr. 7.23. Analysis: S 14.24, Se nil, Hg 83.38, FeO 0.52, Zn 2.17, total 100.31. The zone-axis (111) is regarded as the axis of twinning of the cubic crystal, and the new forms (611), (811), (211) are recorded. The author considers the mineral to be a zinc and iron-bearing variety of metacinnabarite. The associated ankerite gave CaO 29.05, MgO 11.21, FeO 16.88, CO<sub>2</sub> 43.48, total 100.62. F. N. A.

MANASSE (Ernesto). *Alunite sodico-potassica e cuprifera di Calabona (Sardegna)*. Atti (Mem.) Soc. Toscana Sci. Nat. Pisa, 1921, vol. 33, pp. 187-193.

A massive pale-green mineral with a splintery to conchoidal fracture found associated with chrysocolla in the oxidized zone at the Calabona copper mine, near Alghero, Sardinia, is described. In thin section it appears to consist of perfectly homogeneous microcrystalline granules with very occasional threads of chalcedony, and gave on analysis SiO<sub>2</sub> 4.46, CuO 3.66, Al<sub>2</sub>O<sub>3</sub> 33.68, Fe<sub>2</sub>O<sub>3</sub> trace, CaO 1.02, MgO 0.27, K<sub>2</sub>O 2.98, Na<sub>2</sub>O 4.02, SO<sub>3</sub> 32.88, H<sub>2</sub>O 17.22, total 100.19; sp. gr. 2.70. It is regarded by the author as an intimate mixture of a sodium-potassium alunite (K<sub>2</sub>O : Na<sub>2</sub>O = 1 : 2.05) and chrysocolla. Five analyses of chrysocolla, which is abundant, are given. F. N. A.



BIANCHI (Angelo). *Di alcuni interessanti cristalli di andradite nel serpentino del Passo della Rossa (Geisspfad-Pass)*. Atti (Rend.) R. Accad. Lincei, Roma, Cl. Sci. fis. mat. nat., 1923, ser. 5, vol. 32, sem. 1, pp. 504–508.

Small (2–3 mm.), yellowish-brown (internally greenish) rhombic-dodecahedral crystals with minute nuclei of corroded magnetite from a boulder (found by the Piedmont-Swiss frontier) of dark-green lamellar (antigoritic) serpentine are described. The crystals were implanted directly on the surface of the serpentine and more or less embedded in a thin, soft, milky-white amorphous incrustation which covered the surface of the boulder. The andradite gave:  $\text{SiO}_2$  34.84,  $\text{Al}_2\text{O}_3$  0.97,  $\text{Fe}_2\text{O}_3$  26.71,  $\text{FeO}$  1.50,  $\text{MnO}$  trace,  $\text{CaO}$  30.47,  $\text{MgO}$  3.70,  $\text{H}_2\text{O}$  (at  $110^\circ$ ) 0.24,  $\text{H}_2\text{O}$  (+ $110^\circ$ ) 2.39, total 100.46; sp. gr. 3.50. The white amorphous incrustation has the composition of serpentine:  $\text{SiO}_2$  40.97,  $\text{Al}_2\text{O}_3$  1.02,  $\text{Fe}_2\text{O}_3$  0.13,  $\text{FeO}$  8.17,  $\text{MnO}$  0.05,  $\text{MgO}$  35.08,  $\text{H}_2\text{O}$  (at  $110^\circ$ ) 1.73,  $\text{H}_2\text{O}$  (+ $110^\circ$ ) 12.70, total 99.85; sp. gr. 2.58–2.61. F. N. A.

AZZINI (F.). *Blenda di "Su Casteddu"*. Atti (Mem.) Soc. Toscana Sci. Nat. Pisa, 1925, vol. 36, pp. 185–191, 1 pl. †

A crystallographic study of blende from 'Su Casteddu', Iglesias, Sardinia. The crystals examined were mostly small (maximum 5 mm.), colophany-yellow in colour, and implanted with a little galena on more or less crystalline greenish-white fluorite. Eight forms were observed including the new forms (21.4.4) and (10.1.1). F. N. A.

ONORATO (E.). *La celestina di S. Gaudenzio (Senigallia)*. Atti (Rend.) R. Accad. Lincei, Roma, Cl. Sci. fis. mat. nat., 1924, ser. 5, vol. 33, sem. 2, pp. 508–512, 2 figs.

Small colourless, transparent to semitransparent crystals from the junction between the gypsum beds and bituminous marls, which form the hill called St. Gaudenzio near Senigallia [Marche, Italy], are described. Two main types occur: (1) tabular with (001) dominant, (2) prismatic, (011) dominant [Dana's orientation]. Seven forms were noted.  $2V$   $51^\circ 51'$ ,  $\beta_{\text{Na}}$  1.62355,  $\gamma_{\text{Na}}$  1.63076. Analysis:  $\text{SrO}$ : 54.01,  $\text{BaO}$  0.74,  $\text{CaO}$  0.83,  $\text{SO}_3$  43.02, total 98.60. The etching-figures produced by hydrochloric acid and potassium carbonate are described. F. N. A.

GRAVINO (Pia). *Sull' antimonite di Wolfsberg (Harz)*. Atti (Rend.) R. Accad. Lincei, Roma, Cl. Sci. fis. mat. nat., 1926, ser. 6, vol. 3, pp. 210–215.

Seven minute crystals from a specimen on which the mineral forms bundles of more or less contorted prisms associated with quartz were

examined. Twenty-six forms were observed, including the new form (920) and the forms (290) (450) (910) [Dana's axes] reported by W. Koort (1884) but otherwise discredited. No trace of arsenic, bismuth, lead, or copper was found in the mineral. Sp. gr. 4.654. F. N. A.

CARROBI (G.). *Sulla composizione chimica dell'ortite di Ambatofotsikely (Madagascar)*. Atti (Rend.) R. Accad. Lincei, Roma, Cl. Sci. fis. mat. nat., 1926, ser. 6, vol. 3, pp. 206-209.

An analysis on carefully selected orthite gave:  $\text{SiO}_2$  30.42,  $\text{ThO}_2$  2.37,  $\text{Al}_2\text{O}_3$  17.00,  $\text{Ce}_2\text{O}_3$  8.09,  $\text{La}_2\text{O}_3$  &c. 8.31,  $\text{Y}_2\text{O}_3$  1.42,  $\text{Fe}_2\text{O}_3$  5.45,  $\text{FeO}$  11.96,  $\text{MnO}$  0.80,  $\text{CaO}$  13.38,  $\text{H}_2\text{O}$ —0.15,  $\text{H}_2\text{O} +$  0.58, total 99.93, corresponding to the ratios (omitting water)  $\text{RO} : \text{R}_2\text{O}_3 : \text{SiO}_2 = 1.58 : 1 : 1.93$ . Sp. gr. 3.38. The author compares his results with those obtained by Pisani on material from the same locality, and regards it as a partially dehydrated orthite rather richer in RO oxides than unaltered orthites.

F. N. A.

CAROZZI (Enrico). *Sopra una spessartina cromifera di St.-Barthélemy (Valle d'Aosta)*. Atti (Rend.) R. Accad. Lincei, Roma, Cl. Sci. fis. mat. nat., 1926, ser. 6, vol. 3, pp. 230-232.

The specimen described was found on debris from the manganese mine below the village of Lignana, valley of St. Barthélemy [Piedmont]. The mineral occurs as small yellowish-brown masses composed of minute honey-yellow crystals embedded in braunite and associated with rhodochrosite. Sp. gr. 4.35. Analysis:  $\text{SiO}_2$  34.86,  $\text{Al}_2\text{O}_3$  16.31,  $\text{Fe}_2\text{O}_3$  4.88,  $\text{Cr}_2\text{O}_3$  1.08,  $\text{MnO}$  35.05,  $\text{CaO}$  5.52,  $\text{FeO}$  2.12, total 99.82. F. N. A.

COMUCCI (P.). *Osservazione sulla vulfenite e vanadinite di Oulida (Marocco)*. Atti (Rend.) R. Accad. Lincei, Roma, Cl. Sci. fis. mat. nat., 1926, ser. 6, vol. 3, pp. 335-341, 1 fig.

Wulfenite as orange to honey-yellow tabular crystals reaching 1 cm. across is associated with crusts of greenish indistinctly crystalline pyromorphite. Thirteen forms were noted of which (037), (6.6.13), (1.5.62), (19.1.248), (15.23.2), and (8, 13.22) are new [Dana's axes]. Analysis:  $\text{MoO}_3$  38.87,  $\text{PbO}$  60.91, total 99.78. Vanadinite shows the forms *cnxa* [Dana], and gave on analysis:  $\text{PbO}$  76.18,  $\text{V}_2\text{O}_5$  20.34,  $\text{Cl}$  2.58,  $\text{As}_2\text{O}_5$  0.39,  $\text{P}_2\text{O}_5$  0.41, insoluble residue 0.22, total 100.12. [Abstr., vol. 2, p. 26].

F. N. A.

RUIZ (Carmela). *Sulla baritina della miniera Giona (Racalmuto)*. Atti (Rend.) R. Accad. Lincei, Roma, Cl. Sci. fis. mat. nat., 1926, ser. 6, vol. 3, pp. 342-345.

— - *Nuove ricerche sulla baritina di Racalmuto in Sicilia*. Ibid., pp. 490-493.

Specimens from (1) the Giona mine on the south side of Monte Cimicia, and (2) labelled Racalmuto [province] are described. In each case the baryte (rare in Sicily) forms greyish-white to brown cock's-comb aggregates of sharply colour-zoned crystals (zoning attributed to bitumen), associated with well-crystallized sulphur and a little calcite. (1) Matrix of bluish-grey limestone nodules or greyish sulphur-bearing marl. Forms (001), (011), (102), (110);  $a:b:c = 0.81558:1:1.31427$ . Analysis: BaO 55.92, CaO 0.20, SrO 0.13, SO<sub>3</sub> 43.44, CO<sub>2</sub> trace, loss at 115° C. 0.13, total 99.82. (2) Forms (001), (010), (011), (102), (101), (307), and the doubtful new forms (10.0.21) and (10.0.11);  $a:b:c = 0.81558:1:1.31467$ . Analysis: BaO 56.06, CaO 0.25, SrO 0.17, SO<sub>3</sub> 43.51, CO<sub>2</sub> trace, loss at 500° C. 0.11, total 100.10. F. N. A.

GRILL (E.). *Nuove forme cristalline della tormalina elbana*. Atti (Mem.) Soc. Toscana Sci. Nat. Pisa, 1922, vol. 34, pp. 243-248, 2 figs.

Two crystals are described. No. 1, a pink doubly-terminated crystal (upper end yellowish), 22 × 12 mm., from the Grotta d'Oggi [granite quarry], San Piero [in Campo], Elba. Fourteen forms were noted, including the new form (13.12.13);  $rr' 47^\circ 2'$ ,  $c/a = 0.4496$ . No. 2, a yellowish-green crystal (upper end blackish), 3 × 2.5 mm., from the granite of Facciatoia, San Piero [in Campo]. Fourteen forms were noted, including the new forms (501), (12.1.1), (11.1.4), (538), (527);  $rr' 47^\circ 25'$ ,  $c/a = 0.4541$ . F. N. A.

DE ANGELIS (Maria). *Osservazioni sui minerali dei porfidi quarziferi di Cuasso al Monte e di Valganna*. Rend. R. Ist. Lombardo Sci. Lett., 1924, ser. 2, vol. 57, pp. 265-285, 5 figs.

Descriptions are given of the crystallized minerals found in miarolitic cavities in quartz-porphry at Cuasso al Monte and Valganna [Lombardy]. These include molybdenite, galena, blende, pyrite, chalcopyrite (forms  $c m p p_1 e z$  [Dana] and new (17.0.13) and (14.4.1)), fluorite (forms  $a K$  and new (25.10.3)), quartz, hyalite, haematite, calcite, dolomite, chalybite, orthoclase, albite, tourmaline, sericite, biotite, chlorite, kaolin, and baryte. They belong to four phases—magmatic, pneumatolytic, hydrothermal, and secondary. L. J. S.

DE-ANGELIS (Maria). *Intorno alla presenza della Vesuvianite nei giacimenti amiantiferi della Val Malenco*. Atti (Rend.) R. Accad. Lincei, Roma, Cl. Sci. fis. mat. nat., 1925, ser. 6, vol. 1, pp. 80-82.

Idocrase as a pea-green crystalline crust on serpentine, associated with aragonite, dolomite, and a white chlorite, has been found in a small asbestos pit at 'Rosso', WSW. of Dossi di Franscia in Val Malenco, Lombardy. The crystals (*c a m p t s* [Dana]) have acute pyramidal terminations *t* (331); and are quite distinct from the short brown prisms without pyramids from the potstone of Chiesa, also in Val Malenco.

L. J. S.

DE ANGELIS (Maria). *Intorno alla forma cristallina della fosfosiderite di S. Giovanneddu presso Gonnessa in Sardegna*. Ann. Mus. Civ. Stor. Nat. Genova, 1926, vol. 52, pp. 138-148, 3 figs.

Crystals of phosphosiderite from Sardinia when calculated with orthorhombic axes show some discrepancies between the calculated and observed angles; and it is proved by the measurements, and confirmed by etch-figures and the optical orientation, that the crystals are really monoclinic,  $a:b:c = 0.5449:1:0.8968$ ,  $\beta = 89^\circ 24'$ , with the forms (001), (010), (110), (011), (101), (103), ( $\bar{1}11$ ), ( $\bar{5}04$ )?, ( $\bar{1}12$ )?, (117)?, of which (103) and the last three are new. Cleavage (010) perfect, (001) distinct. One crystal was twinned on (101). The optic axial plane is parallel to (010) and the acute negative (not positive) bisectrix is not quite normal to (001) ( $a:c = +3^\circ 10'$  and  $3^\circ 25'$ ; for crystals from Pleystein, Bavaria [Abstr., vol. 1, p. 125],  $4^\circ 12' - 4^\circ 41'$ ); for sodium-light  $a\ 1.6915$ ,  $\beta\ 1.7248$ ,  $\gamma\ 1.7380$ ,  $2V\ 62^\circ 7\frac{1}{2}'$ .

L. J. S.

MANCHOT (W.) & LORENZ (L.). *Über die thermische Dissoziation des Mangan- und Magnesiumcarbonats*. Zeits. Anorg. Chem., 1924, vol. 134, 297-316.

Precipitated manganese carbonate could not be obtained anhydrous without decomposition. The gas pressure when the material is heated varies with the amount of water present. Rhodochrosite from Hambach, Nassau (which gave on analysis MnO 39.63, FeO 4.63, MgO 12.98, SiO<sub>2</sub> 0.74, CO<sub>2</sub> 41.63 = 99.61) gave much lower pressures, e.g. at 450° C. the pressure was 650 mm. Precipitated magnesium carbonate gave similar results. Dried material commences to decompose at 400°, and at 540° C. the pressure is one atmosphere. It is suggested that the much higher values obtained by R. Marc and A. Šimek (1913) were due to hydrolysis:  $MgCO_3 + H_2O = Mg(OH)_2 + CO_2$ .

L. J. S.



EITEL (W.). *Über die thermische Dissoziation des Magnesiumcarbonates und des Dolomits*. Neues Jahrb. Min., 1925, Beilage-Band 51, pp. 477-493, 5 pls., 3 text-figs. †

The discrepancy between the results of R. Mark and A. Šimek (1913) and those of W. Manchot and L. Lorenz (preceding Abstr.) for the dissociation pressures of magnesium carbonate is discussed, and compared with the theoretical values deduced from Nernst's heat theorem. New experiments made with pure crystallized dolomite in fusions of  $\text{NaCl} + \text{CaCl}_2$  or  $\text{Na}_2\text{Ca}(\text{CO}_3)_2$  gave results (dissociation at  $510^\circ \text{C}$ . under 1 atmosphere; at  $650^\circ$  under 82 atmos., &c.) which are closer to those of Mark and Šimek. The products were examined microscopically. It is assumed that dolomite readily breaks down into  $\text{CaCO}_3 + \text{MgCO}_3$  and that the dissociation phenomena differ only slightly from those of magnesite. L. J. S.

GOLDSCHMIDT (V.) & SCHRÖDER (R.). *Pyrit-Zwillinge von Traversella*. Beitr. Kryst. Min., 1923, vol. 2, pp. 27-29, 1 pl.

Two specimens of interpenetrating-twins of pyrite from Traversella [Piedmont] are figured and described. They are twinned by rotation of  $90^\circ$  about a cube-edge as twin-axis, this bringing into coincidence the octahedral faces in the two portions. On these coincident faces the triangular striations in the zone *ose* [Dana's letters] are parallel in the two portions, but the triangles are in reversed position. L. J. S.

GOLDSCHMIDT (V.) & PORTER (Mary W.). *Rotkupfererz von Grube Wolf, Hersdorf bei Siegen*. Beitr. Kryst. Min., 1923, vol. 2, pp. 30-34, 1 pl., 1 text-fig.

Crystals of cuprite in limonite from the Wolf mine [at Herdorf in Rhenish Prussia] are of two types and generations, those of rhombic-dodecahedral habit being earlier and those of octahedral habit later. The forms noted are  $c(100)$ ,  $\beta(610)$ ,  $\epsilon(510)$ ,  $f(410)$ ,  $a(310)$ ,  $d(110)$ ,  $q(211)$ ,  $n(322)$ ,  $t(433)$ ,  $u(221)$ ,  $p(111)$ , of which  $\beta f a t$  are new. Parallel growths ('intercrossing') of the two types also occur, and these present a resemblance to interpenetrating-twins. L. J. S.

GOLDSCHMIDT (V.) & SCHRÖDER (R.). *Über Rotnickelkies*. Beitr. Kryst. Min., 1923, vol. 2, pp. 35-46, 1 pl.

Crystals of niccolite from Riechelsdorf [Hesse], Eisleben, Sangerhausen, and Mansfeld (Harz) are figured and described. The forms noted are  $o(0001)$ ,  $a(10\bar{1}0)$ ,  $b(11\bar{2}0)$ ,  $e(10\bar{1}3)$ ,  $z(10\bar{1}1)$ ,  $w(30\bar{3}2)$ ,  $p(11\bar{2}2)$ . From the angle  $oz = 57^\circ 51'$  measured on Riechelsdorf crystals  $a:c = 1:1.3778$ . A fourling from Riechelsdorf is a double twin on two laws: (1) twin-plane

z; (2) a hetero-twin with rotation of  $42^{\circ} 40'$  about the normal to z until zones [z b] in the two crystals coincide. The isomorphous relations of NiS, NiAs, NiSb, CdS, ZnS, FeS, ZnO, AgI, and  $H_2O$  are compared in the several possible orientations of the crystals. L. J. S.

NEFF (Oscar). *Über Antimonit von Ichinokawa, Japan.* Beitr. Kryst. Min., 1923, vol. 2, pp. 47-97, 4 pls., 4 text-figs.

A detailed crystallographic study of stibnite from Japan. 36 new crystal-forms are recorded. The combinations of forms on individual crystals are noted, and statistics given of the relative frequency and sizes of the faces. A comparative table of 164 crystal-forms for stibnite shows 132 from Japan and 83 from Felsőbánya. Twins on (103) [Dana's axes] are described. L. J. S.

GOLDSCHMIDT (V.). *Über Größe und Häufigkeit der Flächenarten.* Beitr. Kryst. Min., 1923, vol. 2, pp. 98-101.

A discussion on the relative frequency and sizes of crystal-faces. Using Neff's data for stibnite [preceding abstract] it is seen that the largest faces are also of the most frequent occurrence. L. J. S.

GOLDSCHMIDT (V.) & SCHRÖDER (R.). *Kupferkies und Bleiglanz regelmäßig verwachsen von Horhausen.* Beitr. Kryst. Min., 1923, vol. 2, pp. 102-104, 1 pl.

Two specimens showing a regular intergrowth of chalcopyrite and galena from Horhausen [Rhenish Prussia] are figured and described. In one, the axes of the two minerals are parallel; and in the other, the faces (111) are parallel. L. J. S.

GOLDSCHMIDT (V.) & SCHRÖDER (R.). *Kupferkies-Fünfling von Grube Viktoria bei Müsen.* Beitr. Kryst. Min., 1923, vol. 2, pp. 105-109, 1 pl., 6 text-figs.

A cyclic twin of chalcopyrite from the Victoria mine [at Littfeld in Westphalia] consisting of five individuals twinned on (111) is figured and described. It is very similar to fivelings of spinel. L. J. S.

GOLDSCHMIDT (V.) & SCHRÖDER (R.). *Eisenglanz und Rutil in gesetzmäßiger Verwachsung.* Beitr. Kryst. Min., 1923, vol. 2, pp. 110-117, 1 pl.

Goniometric measurements were made on the regular growths of rutile on plates of haematite from Cavradi [gorge, Tavetsch-thal, Switzerland]. a of rutile and c of haematite are coincident, there is approximate

coincidence between  $s$  and  $e$  of rutile with  $n$  and  $a$  respectively of haematite [Dana's letters].

L. J. S.

GOLDSCHMIDT (V.) & SCHRÖDER (R.). *Thorianit von Ceylon*. Beitr. Kryst. Min., 1924, vol. 2, p. 141, 3 figs.

Interpenetrating twinned cubes of the fluorite type of twinning are figured.

L. J. S.

GOLDSCHMIDT (V.) & NEFF (O.). *Orthoklas von Neustadt i. Baden*. Beitr. Kryst. Min., 1924, vol. 2, pp. 164-166, 4 figs.

A cluster of three crystals of orthoclase from granite-porphry is described. Individuals I and II are twinned on the Carlsbad-law, and II and III on the Baveno-law. The face  $b(010)$  of I then coincides with  $c(001)$  of III. The relation between I and III is called a Neustadt hetero-twin, and the whole group is called a 'closed triplet'. A simple crystal of prismatic habit shows a pyramidal termination, with  $n(021)$  and  $o(\bar{1}11)$  and quite small  $c(001)$  and  $y(\bar{2}01)$ .

L. J. S.

GOLDSCHMIDT (V.) & SCHRÖDER (R.). *Heterozwillinge von Orthoklas mit Bindung  $P_1M_2$* . Beitr. Kryst. Min., 1923, vol. 2, pp. 118-122, 10 figs.

There are seven possible cases of hetero-twins for orthoclase in which  $P = c(001)$  of one individual coincides with  $M = b(010)$  of the other. One of these is equivalent to the Baveno-law (a homo-twin on  $n(021)$ ); others are the Neustadt [preceding abstract], Koppenstein, and Elbogen laws.

L. J. S.

DE KLERK (A.) & GOLDSCHMIDT (V.). *Calcit, Ankerit, Eisenspat regelmäßig verwachsen vom Simplon Tunnel*. Tschermaks Min. Petr. Mitt., 1925, vol. 38, pp. 159-164, 1 pl.

Specimens from the Simplon tunnel show small crystals of clear calcite in regular growth on yellowish-white ankerite or on chalybite. The ankerite has angle  $cr\ 43^\circ 54'$ , sp. gr. 3.06,  $\epsilon\ 1.5264$ ,  $\omega\ 1.7194$ , and gave on analysis  $\text{CaCO}_3\ 50.81$ ,  $\text{MgCO}_3\ 22.65$ ,  $\text{FeCO}_3\ 24.44$ ,  $\text{MnCO}_3\ 1.10$ , insol. 0.43 %, agreeing with the formula  $\text{Ca}_2\text{Mg}(\text{Fe}, \text{Mn})\text{C}_4\text{O}_{12}$ . This suggests that the formula of dolomite should be  $2\text{CaMgC}_2\text{O}_6$ , and that of calcite  $4\text{CaCO}_3$  or  $\text{Ca}_4\text{C}_4\text{O}_{12}$ . Analysis of the calcite crystals gave  $\text{CaCO}_3\ 97.55$ ,  $\text{MgCO}_3\ 0.38$ ,  $\text{FeCO}_3\ 0.88\%$ . Since the crystal-angles of calcite and ankerite are not quite identical strict parallelism is not possible; it was found that the  $r$  face of calcite is parallel to the underlying  $r$  face of ankerite ('single-face covering').

L. J. S.

MARCHET (Arthur). *Cölestin von Göstling*. Tschermaks Min. Petr. Mitt., 1924, vol. 36, pp. 212-213.

Celestine as colourless to pale-blue crystals, with a length of 1 cm. along the  $a$ -axis and forms *occlz* [Dana's letters], occurs with calcite in crevices in limestone at Göstling in the Ybbs valley, Upper Austria.

L. J. S.

KA10 (Takeo). *Penwithite from the Kawadzu mine in the province of Idzu*. Journ. Geol. Soc. Tokyo, 1924, vol. 31, pp. 19-22.

A brown, amorphous mineral occurs as a primary gangue mineral (being cut by veinlets of chalcedony, rhodonite, and calcite) in a gold-silver vein in the Kawadzu mine at Rendaiji. It is brittle with conchoidal fracture, vitreous lustre, transparent to sub-transparent, and optically isotropic; sp. gr. 2.20, H.  $3\frac{1}{2}$ . It is decomposed by boiling HCl with separation of gelatinous silica. Analysis,  $\text{SiO}_2$  39.57, MnO 31.81,  $\text{Al}_2\text{O}_3$  1.59,  $\text{Fe}_2\text{O}_3$  1.29, CaO 1.03, MgO 0.31,  $\text{H}_2\text{O}$  24.30, total 99.90 (also Au 0.0004, Ag 0.06 %), gives the formula  $\text{MnSiO}_3 \cdot n\text{H}_2\text{O}$ . The mineral is a gel with admixed impurities, and is identified with the Cornish penwithite.

L. J. S.

SCHAIRER (J. F.) & LAWSON (C. C.). *Copiapite from the Santa Maria Mts., Eastern Riverside Co., California*. Amer. Min., 1924, vol. 9, pp. 242-244, 1 fig.

Analysis of yellowish-brown crystalline material (optically positive,  $\beta$  1.53,  $\gamma$  1.57,  $\text{Bx}_0 \perp$  cleavage) gave  $\text{Fe}_2\text{O}_3$  26.39,  $\text{SO}_3$  39.79,  $\text{H}_2\text{O}$  29.92, CaO 0.27, MgO 3.19, insol. 0.30 = 99.86, agreeing with the formula  $2\text{Fe}_2\text{O}_3 \cdot 5\text{SO}_3 \cdot 19\text{H}_2\text{O}$  or  $\text{Fe}_4(\text{OH})_2(\text{SO}_4)_5 \cdot 18\text{H}_2\text{O}$ . Earlier analyses are plotted and show a constant ratio  $2\text{Fe}_2\text{O}_3 : 5\text{SO}_3$ , while water varies from  $16\text{H}_2\text{O}$  to  $22\text{H}_2\text{O}$ .

L. J. S.

SCHALLER (Waldemar T.) & HENDERSON (Edward P.). *Purple muscovite from New Mexico*. Amer. Min., 1926, vol. 11, pp. 5-16.

Pegmatite veins in pre-Cambrian schists near Taos in Taos Co. contain lepidolite and spodumene and show a replacement of the various minerals by purple (pink to violet) muscovite. Microcline is pink with impregnated muscovite. Analysis I (also FeO not det.,  $\text{Li}_2\text{O}$  trace) of paler material from the Harding mine; D 2.83,  $\alpha$  1.558,  $\beta$  1.587,  $\gamma$  1.591,  $2E$   $69^\circ$ . Analysis II of deeper coloured muscovite from Pilar; D 2.85,  $\alpha$  1.565,  $\beta$  1.597,  $\gamma$  1.602,  $2E$   $77^\circ$ ; strongly pleochroic,  $\alpha$  pale bluish-purple,  $\beta$  brownish-orange,  $\gamma$  deep strawberry-red. This is unusually



rich in ferric iron, and search for muscovites rich in iron led to a re-examination of the 'baddeckite' from Baddeck, Nova Scotia (G. C. Hoffmann, 1898). This was found to consist of scales of haematite in a clay base.

	SiO <sub>2</sub> .	Al <sub>2</sub> O <sub>3</sub> .	Fe <sub>2</sub> O <sub>3</sub> .	Mn <sub>2</sub> O <sub>3</sub> .	Na <sub>2</sub> O.	K <sub>2</sub> O.	H <sub>2</sub> O.	F.	Total.
I.	44.80	37.72	0.67	0.21	1.40	10.66	4.52	0.20	100.10
II.	45.16	35.61	2.95	0.70	1.03	10.32	4.86	0.05	100.16

L. J. S.

SCHAIRER (J. F.) & LAWSON (C. C.). *On pickeringite from Portland, Connecticut.* Amer. Journ. Sci., 1926, ser. 5, vol. 11, pp. 301-304, 1 fig.

Pickeringite as masses of minute white needles is now forming near the contact of pegmatite and schist in the Strickland quarry. The needles show an extinction-angle of 28°, very low birefringence, and refractive indices slightly above and below 1.485. Analysis gave SO<sub>3</sub> 36.86, Al<sub>2</sub>O<sub>3</sub> 11.64, Fe<sub>2</sub>O<sub>3</sub> 0.24, MgO 4.16, MnO 1.02, CuO 0.17, NiO trace, H<sub>2</sub>O 46.10, insol. 0.24 = 100.43, agreeing with MgSO<sub>4</sub> · Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> · 22H<sub>2</sub>O. Published analyses of pickeringite plotted on a graph also indicate 22H<sub>2</sub>O, rather than 24H<sub>2</sub>O.

L. J. S.

SCHWARTZ (G. M.). *On the nature and origin of hisingerite from Parry Sound, Ontario.* Amer. Min., 1924, vol. 9, pp. 141-144, 4 figs.

Hisingerite, occurring with pyrite and chalcopyrite in the Wilcox copper mine, has a purplish cast on the fresh conchoidal fracture. In thin section it is orange or brown and isotropic or anisotropic,  $n$  1.50-1.56. It encloses remnants of hypersthene, from which it has evidently been derived. Sp. gr. 2.50. Analysis by R. J. Leonard, SiO<sub>2</sub> 35.57, TiO<sub>2</sub> 0.12, Fe<sub>2</sub>O<sub>3</sub> 39.20, FeO 4.80, Al<sub>2</sub>O<sub>3</sub> 0.38, CaO 0.85, MgO 1.60, H<sub>2</sub>O + 110° 11.60, H<sub>2</sub>O - 110° 6.00 = 100.12, corresponds well with the formula, H<sub>4</sub>Fe<sub>2</sub>Si<sub>2</sub>O<sub>9</sub> · 2H<sub>2</sub>O, given for canbyite, the crystalline variety of hisingerite [Abstr., vol. 2, p. 253].

L. J. S.

SCHWARTZ (G. M.) & LEONARD (R. J.). *Alteration of spodumene in the Etta mine, Black Hills, S. D.* Amer. Journ. Sci., 1926, ser. 5, vol. 11, pp. 257-264, 2 figs.

The enormous crystals ('logs') of spodumene occurring in pegmatite at this locality measure up to 40 feet long and 4 feet across. The mineral weathers to a friable mass with a soapy feel: this consists of scaly and fibrous sericite, and corresponds with 'killinite'. Seven analyses are

given showing the progressive alteration: the extremes and one intermediate are:

	SiO <sub>2</sub> .	Al <sub>2</sub> O <sub>3</sub> .	Fe <sub>2</sub> O <sub>3</sub> .	FeO.	MgO.	CaO.	Na <sub>2</sub> O.	K <sub>2</sub> O.	Li <sub>2</sub> O.	H <sub>2</sub> O.	Sp. gr.	H.
I.	62.91	28.42	0.53	—	0.13	0.11	0.46	0.69	6.78	0.28	3.167	6½
II.	60.61	29.29	0.58	—	0.31	0.23	0.48	0.59	5.76	2.48	3.023	2½
III.	47.29	31.31	1.19	0.37	2.38	0.69	0.88	4.07	0.28	11.80	2.582	2½

L. J. S.

LARSEN (Esper S.). *The identity of ectropite and bementite*. Amer. Min., 1925, vol. 10, pp. 418-421.

Ektropite from Långban, Sweden [Abstr., vol. 1, p. 19], has the acute negative bisectrix nearly perpendicular to the perfect cleavage (001) with 2E nearly 0°, and  $\alpha$  1.608,  $\beta$  and  $\gamma$  1.633. The optical and physical characters and chemical analyses of bementite, caryopilite, and ektropite are tabulated and compared, and it is suggested that these minerals are identical [Abstr., vol. 1, p. 176]. The characters of the serpentine showing three rectangular cleavages from Brewster, New York, are also similar, and it is further suggested that bementite is the manganese member of the serpentine series.

L. J. S.

LARSEN (E. S.) & SHANNON (Earl V.). *Ganophyllite from Franklin Furnace, New Jersey*. Amer. Min., 1924, vol. 9, pp. 238-240.

A mineral previously referred to as a probably new hydrated manganese silicate [Abstr., vol. 2, p. 473] is now identified as ganophyllite, which was recorded from Franklin Furnace by C. Palache in 1910. Analyses on 73 mg. gave SiO<sub>2</sub> 39.18, Al<sub>2</sub>O<sub>3</sub> 8.57, Fe<sub>2</sub>O<sub>3</sub> trace, MnO 36.33, ZnO 3.67, CaO 2.04, H<sub>2</sub>O + 110° 5.70, H<sub>2</sub>O - 110° 1.63 = 97.12. It is optically negative and biaxial with small angle,  $\alpha$  1.563,  $\beta$  1.593,  $\gamma$  1.593. New determinations on ganophyllite from Pajsberg, Sweden, gave  $\alpha$  1.573,  $\beta$  1.603,  $\gamma$  1.604, 2V 26°, negative.

L. J. S.

HEWETT (D. F.) & SCHALLER (W. T.). *Hisingerite from Blaine Co., Idaho*. Amer. Journ. Sci., 1925, ser. 5, vol. 10, pp. 29-38, 1 fig. Correction, *ibid.*, 1926, vol. 11, p. 376.

Hisingerite occurs in several mines in the Mineral Hill district as an alteration product of chalybite at depths of 200 to 450 feet below water-level and the lower limit of the oxidation-zone. It is traversed by later veins of marcasite and calcite. Material from the Bellevue King mine is claret-red on freshly exposed surfaces, quickly changing to black and later to dark-brown. It is wholly isotropic with  $n$  1.44; hardness 3½. Analysis, SiO<sub>2</sub> 38.14, Fe<sub>2</sub>O<sub>3</sub> 36.66, FeO 0.84, MgO 2.45, H<sub>2</sub>O + 8.53,

$\text{H}_2\text{O} - 13.20$ , total  $99.82$ , agrees approximately with  $\text{MgO} \cdot 3\text{Fe}_2\text{O}_3 \cdot 9\text{SiO}_2 \cdot 17\text{H}_2\text{O}$ . Other material is dark-brown and shows no colour change; it is partly isotropic and partly birefringent with  $n$  1.66.

L. J. S.

AYRES (Vincent L.). *Pyrite from Tucson, Arizona*. Amer. Min., 1924, vol. 9, pp. 91-92, 2 figs.

Small crystals of pyrite occur in an altered rhyolitic ash and in calcite seams in this rock in the Arizona-Tucson copper mine near Tucson. Five habits of crystals are distinguished. The crystals embedded in calcite are very brilliant and rich in faces. On those of one habit the seven possible kinds of simple forms are represented, namely: the cube (100); octahedron (111); rhombic-dodecahedron (110); triakis-octahedron (221); icositetrahedra (411), (311), (211), (433); pentagonal-dodecahedron (210); dyakis-dodecahedra (421), (321), and negative (453).

L. J. S.

SOSMAN (Robert B.) & POSNJAK (E.). *Ferromagnetic ferric oxide, artificial and natural*. Journ. Washington Acad. Sci., 1925, vol. 15, pp. 329-342, 3 figs. [Cf. Abstr., vol. 1, pp. 142-3.]

Magnetic (ferromagnetic)  $\text{Fe}_2\text{O}_3$  has long been known as an artificial product. It may be prepared by oxidizing precipitated  $\text{Fe}_3\text{O}_4$ , or by dehydrating lepidocrocite ( $\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$ ). (When goethite is dehydrated only paramagnetic  $\text{Fe}_2\text{O}_3$  results.) A natural ferromagnetic ferric oxide has been found as a chocolate-brown powder in gossan on Iron Mountain, Shasta Co., California. Analysis of this gave  $\text{Fe}_2\text{O}_3$  85.3,  $\text{FeO}$  2.40,  $\text{H}_2\text{O}$  3.1 %, &c. In magnetic susceptibility, as well as in its X-ray pattern, it is similar to the artificial magnetic  $\text{Fe}_2\text{O}_3$  and also to natural magnetite. It thus represents a form of ferric oxide distinct from haematite.

L. J. S.

FOSHAG (William F.). *Centrallasite from Crestmore, California*. Amer. Min., 1924, vol. 9, pp. 88-90.

White centrallasite, showing a pearly platy cleavage or a fine-grained texture, replaces the quartz of a pegmatite-vein in limestone. Analysis,  $\text{SiO}_2$  57.00,  $\text{Al}_2\text{O}_3$  0.26,  $\text{CaO}$  30.86,  $\text{MgO}$  0.20,  $\text{H}_2\text{O}$  11.88 = 100.20, gives the formula  $4\text{CaO} \cdot 7\text{SiO}_2 \cdot 5\text{H}_2\text{O}$ , rather than  $2\text{CaO} \cdot 3\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ . Sp. gr. 2.51, H.  $2\frac{1}{2}$ . The mineral fuses easily with intumescence to a clear blebby glass, and is soluble in  $\text{HCl}$  with separation of silica. Optically negative and biaxial with small angle,  $\text{Bx}_1 \perp$  cleavage,  $\alpha$  1.535,

$\beta$  1.548,  $\gamma$  1.549. Identical optical data were obtained for the original centrallasite from Nova Scotia. L. J. S.

FOSHAG (Wm. F.) & GAGE (R. B.). *Hedyphane from Franklin Furnace, New Jersey*. Amer. Min., 1925, vol. 10, pp. 351-353.

White to pale-buff, massive hedyphane with greasy lustre fills veins in the willemite-franklinite ore and is associated with calcite and rhodonite. It is optically uniaxial and negative,  $\omega$  2.026,  $\epsilon$  2.010. Analysis gave: Cl 2.98,  $As_2O_5$  29.94, PbO 52.77, MnO + FeO 0.28, CaO 14.98, MgO 0.10, ZnO 0.23,  $H_2O$  0.08, insol. 0.17, total (less O for Cl) 100.85. Calcium predominates over lead (Ca:Pb = 267:236), and the mineral is to be regarded as a distinct species in the apatite group. L. J. S.

STEELE (L. L.). *Notes on two fossil coal resins*. Amer. Journ. Sci., 1924, ser. 5, vol. 7, pp. 389-392.

A resin in coal from Coalmont, British Columbia, is clear yellow with greenish fluorescence. H.  $2\frac{1}{2}$ , sp. gr. 1.051, m. p.  $390^\circ C$ . Analysis gave: C 81.93, H 10.00, O [7.74], ash 0.33 %. The material is only slightly soluble in alcohol or benzol. Another resin, from the Black Hawk mine, Hiawatha, Utah, has H.  $2\frac{1}{2}$ , sp. gr. 1.03, m. p.  $195^\circ$ , and contains C 82.62, H 10.14, O [6.81], ash 0.43 %. Although very different in their physical properties, both samples are classified as retinite. Some comparative tests were made with Baltic amber (m. p.  $375^\circ C$ ). L. J. S.

ROGERS (Austin F.). *Clinozoisite from Lower California*. Amer. Min., 1924, vol. 9, pp. 221-224, 1 fig.

Specimens from Juarez, Lower California, Mexico, consist of grey to greenish-grey clinozoisite, or pink to colourless zoisite, or of a parallel intergrowth of the two minerals. The large crystals are embedded in prehnite. The clinozoisite is monoclinic with elongation along the  $b$ -axis and is twinned on  $a(100)$ . It has sp. gr. 3.212,  $a$  1.715,  $\beta$  1.717,  $\gamma$  1.721, and shows anomalous interference-colours. Analysis by W. R. Waelty,  $SiO_2$  37.81,  $Al_2O_3$  31.85,  $Fe_2O_3$  2.99, FeO 0.76, MnO trace, CaO 24.36,  $H_2O$  2.25 = 100.02, shows it to be low in iron and thus dimorphous with zoisite (which has lower refraction 1.707). L. J. S.

POITEVIN (Eugene). *A new occurrence of lansfordite from Atlin, B. C.* Amer. Min., 1924, vol. 9, pp. 225-228, 2 figs.

Thin (1 mm.) films of translucent lansfordite line cavities in porous hydromagnesite from Atlin, British Columbia. Measurement of minute



crystals shows them to be monoclinic with the forms (100), (010), (120), (111), (101), (102), (302), (011), (321), (323), and (001), rather than anorthic as described by S. L. Penfield in 1890 (Penfield's  $m(110)$  and  $P(111)$  become (100) and (201) respectively). The optic axial plane is parallel to (100) and a positive biaxial figure is seen through the basal cleavage;  $2V(\text{Na}) 59^\circ 30'$ ,  $\alpha 1.456$ ,  $\beta 1.468$ ,  $\gamma 1.507$ . These optical characters agree with those of the artificial carbonate ( $\text{MgCO}_3 \cdot 5\text{H}_2\text{O}$ ) prepared by Moressée and described by G. Cesàro in 1910. [Cf. Abstr., vol. 1, p. 233.]

L. J. S.

SHANNON (Earl V.). *The identity of carrollite with linnaeite.* Amer. Journ. Sci., 1926, ser. 5, vol. 11, pp. 489-493.

Five new analyses of carrollite (W. L. Faber, 1852) from Carroll Co., Maryland, show S 41.34-44.89, Co 36.08-48.70, Ni trace-7.65, Cu 2.40-15.43, Fe 0.28-4.57. The material has a reddish colour and a good cubic cleavage. Microscopical examination of polished surfaces shows the material to be optically isotropic and to be intergrown with chalcopyrite and chalcosine. It is therefore a mixture of linnaeite and copper ores.

L. J. S.

SHANNON (Earl V.). *An iron amphibole similar to hudsonite from Custer County, Idaho.* Amer. Journ. Sci., 1924, ser. 5, vol. 8, pp. 323-324.

Glistening black prisms of amphibole with diopside and calcite gave on analysis (including about 4% diopside):  $\text{SiO}_2$  38.50,  $\text{TiO}_2$  trace,  $\text{Al}_2\text{O}_3$  10.88,  $\text{Fe}_2\text{O}_3$  6.70,  $\text{FeO}$  27.28,  $\text{MnO}$  trace,  $\text{CaO}$  11.30,  $\text{MgO}$  1.40,  $\text{Na}_2\text{O}$  1.22,  $\text{K}_2\text{O}$  1.66,  $\text{H}_2\text{O} (+110^\circ)$  1.27 = 100.16. It is optically negative with  $2V$  small,  $c:\gamma = 23^\circ-37^\circ$ ,  $\alpha 1.695$ ,  $\beta 1.702$ ,  $\gamma 1.712$ ; pleochroism intense,  $\alpha$  greenish-brown,  $\beta$  brownish-green,  $\gamma$  smoky blue-green. These characters are near to those of the varieties hudsonite and hastingsite.

L. J. S.

SHANNON (Earl V.). *Jamesonite from Slate Creek, Custer County, Idaho.* Amer. Min., 1925, vol. 10, pp. 194-197.

A specimen, with some quartz, pyrite, chalybite, and mispickel, is black-grey with coarse granular texture. The individual grains (5-10 mm. across) show cleavages  $c(001)$ ,  $n(120)$ , and  $b(010)$ ;  $nn' = 62^\circ 44'$ . Analysis, Pb 40.32, Fe 3.68, Sb 32.92, S 21.40, insol. 1.24 = 99.56, gives the formula  $4\text{PbS} \cdot \text{FeS} \cdot 3\text{Sb}_2\text{S}_3$ .

L. J. S.

SHANNON (Earl V.). *Tetradymite from the Hailey quadrangle, Idaho.*  
 Amer. Min., 1925, vol. 10, pp. 198-199.

Grains of tetradymite in a gangue of quartz, calcite, and dolomite gave (after deducting 6.57 % gangue) Bi 56.35, Pb 1.48, Te 35.62, Se 2.17, S 4.38, agreeing with  $\text{Bi}_2\text{Te}_2\text{S}$ . L. J. S.

MARTENS (James H. C.). *Scorodite from Putnam County, New York.*  
 Amer. Min., 1924, vol. 9, pp. 27-28.

A new cut in shattered rock at the old arsenopyrite mine near Carmel disclosed abundant scorodite filling fissures. It is fine-grained and porous and pale-green in colour. It sometimes forms stalactites, and is associated with limonite and gypsum. Analysis gave:  $\text{Fe}_2\text{O}_3$  34.68,  $\text{As}_2\text{O}_5$  48.89,  $\text{P}_2\text{O}_5$  0.04,  $\text{H}_2\text{O} +$  15.68,  $\text{H}_2\text{O} -$  1.12 = 100.41.

L. J. S.

COOK (Chas. W.). *Marcasite from the Racine dolomite, Racine, Wis.*  
 Amer. Min., 1924, vol. 9, pp. 151-152.

Crystals of marcasite from cavities in dolomite near Racine, Wisconsin, show the forms *cbmelzrs* [Dana's letters], and new *w* (027) and *x* (029). The forms *r* or *l* predominate in different types. Untarnished material is tin-white in colour. L. J. S.

ALLAN (J. A.). *Ice crystal markings.* Amer. Journ. Sci., 1926, ser. 5, vol. 11, pp. 494-500, 10 figs.

Mud saturated with water was frozen and plaster casts taken of the surface. The reticular markings present a resemblance to certain markings in Cretaceous and Devonian rocks that have been described as organic remains. L. J. S.

MOORE (E. S.). *Sources of carbon in the pre-Cambrian formations.* Trans. Roy. Soc. Canada, 1925, ser. 3, vol. 19, sect. 4, pp. 21-26, 3 pls.

Carbon occurs in pre-Cambrian rocks as carbonates, graphite, and solid bitumen (anthraxolite). These may have been derived from the primary hydrocarbons and carbon dioxide of magmas; but in recent years much evidence has been forthcoming of the presence of algal plant remains in these ancient rocks, and it is therefore likely that the carbon may be of organic origin. L. J. S.

KRAUS (Edward H.). *Some unusual specimens of "float" copper.*  
 Amer. Min., 1924, vol. 9, pp. 23-26, 6 figs.

A large slab (483 lb.) of native copper, found while ploughing in Houghton Co., Michigan, shows glacial striae, signs of human workmanship, and later alteration on the surface to cuprite and malachite.

L. J. S.













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